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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII — CLEVELAND, OHIO, MARCH 31, 1904 — NUMBER 13

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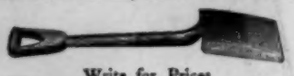

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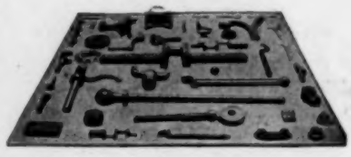

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, MARCH 31, 1904 NUMBER 13

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The firmness of the market for steel billets and sheet bars is a significant feature of the situation, and the payment of premiums on steel bought for delivery in the next 60 days is something that would not have been regarded possible a month ago. The steel corporation, with a daily production of nearly 30,000 tons of ingots, is practically at its maximum of last year; and in pig iron production it has reached 84 percent of its capacity, compared with a maximum of 90 percent, the usual deduction being about 10 percent for repairs and accidents. Export statistics show that a relatively unimportant amount of steel products was sent abroad in February and the presumption is that in March likewise the great bulk of this heavy production of steel mills is going into home consumption. These facts about the corporation's activity go counter to much that is said by way of general impressions of the situation. In the week sheet bars have brought premiums of $1 to $1.50 on the prices of the steel manufacturers, Pittsburg deliveries being reported at $25.25 to $25.50, while billets for early delivery have brought 25 cents above schedule.

The pig iron market has not been active since the recent advance in Southern iron. Sales by leading Southern producers have been heavy in March, one company booking 95,000 tons, and most furnace companies are beyond the necessity of an active scramble for business for the present. The $10 basis cannot be considered established, as considerable business has been done within the week at $9.75. The flurry over a 35-cent cut in freights by an Indiana road was only temporary and restoration of the old rate on April 1 is promised. In the Central West there has been some buying of foundry iron for delivery in the second half of the year, an Ohio implement works taking 6,000 tons, on part of which $10 Birmingham was paid for No. 2, while on Northern irons the basis was $12.50 to $13 at furnace. On a pipe works order for 3,000 tons $9.75 Birmingham for No. 2 was done and $9.25 for No. 3. There is a disposition on the part of many foundrymen to wait until the $10 price has been tested, and meantime most buying is for early needs. The jobbing foundry trade is quiet and it is estimated that the foundries of the country are operating at about two-thirds capacity. Steel foundries report slack demand and low prices.

The appearance of steel car orders is an encouraging development of the railroad situation. The Pennsylvania Railroad has placed 1,000 cars with the American Car & Foundry Co. and 1,125 with the Standard Steel Car Co., and the Pittsburg & Lake Erie Road has ordered 1,000 steel cars. These contracts will require 30,000 tons of plates and shapes and nearly an equal amount of forgings and castings. The contract for 52,000 tons of Pennsylvania Railroad tunnel castings is expected to be placed this week and several pig iron interests have made bids on the iron not only for these castings, but for the entire tonnage that will be called for in the next three years. On the three years' supply such pig iron bids run from $2 to $2.50 above today's prices.

A cloud upon construction prospects in the East is the strikes in certain building trades and the possibility of a repetition of the embargo of last year. The financing of construction enterprises is also an obstacle, and in New York 50,000 tons of such work is held up for this reason, this estimate including only large contracts. The American Bridge Co. has taken a 4,000-ton contract in New York the past week in addition to some railroad bridge work. The plate situation has improved in the Chicago district, the local mill having taken fair orders on car and boiler works account. Plate mill operation generally shows some slight improvement. Heavy shipments of wire products continue and in the West jobbers' orders are more than the mills can handle. Rail business is lacking apart from a 10,000-ton order of the Lehigh Valley Road.

Meetings of the various steel manufacturers' associations will be held in New York next week, but no changes in prices are expected. The Lake Superior iron ore producers have postponed their final meeting from April 1 to April 7 in New York. The question of price is not so much an obstacle to agreement as other considerations, particularly output. If no association results for this year it is considered unlikely that it will ever be revived with the same membership.

Indications are that the proposition for a reduction in sheet and tin plate mill wages has been rejected by the Amalgamated Association by an emphatic majority.

The German steel syndicate is reported to have made overtures to the leading steel interest in this country and to certain British steel manufacturers with a view to lessening competition. The shipment of American pipes and tubes into Germany is particularly objectionable to the German interests. It is understood that the proposal for an arrangement has received no encouragement from American interests.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, March 30.

Premiums of $1 to $1.50 a ton are now being paid over pool prices on sheet and tin bars for delivery within 30 to 60 days, and producers having billets for this delivery are also asking premiums of 25 cents a ton. Less than two months ago the competition among the steel producers for sheet and tin bars and billets was exceedingly keen, and there is little doubt that large tonnages were placed below the agreed prices. So completely have conditions changed meantime that finishing mills that did not contract for future deliveries are having much difficulty in securing steel and are compelled to pay premiums. The subsidiary companies of the United States Steel Corporation are out of the market entirely for the present on unfinished steel, some of their finishing mills not securing their full quota. The old Sharon open-hearth plant and the Bessemer plant at Columbus are the only steel plants of the corporation that are idle at the present time. Improvements are being made at Columbus and the plant will be in operation shortly, while the Donora open-hearth plant will be started for the first time shortly after the blowing in of one of the two furnaces of this plant, early next week. The second stack will be ready for operation about a month later. The operation of this steel plant will greatly increase the corporation's steel output, and the new operation will be economical as the direct metal process will be used. There is little demand for steel, however, for shipment beyond June 1, all of the mills being in position to take such business at agreed prices. We note the sale of 1,500 tons of open-hearth sheet bars for delivery in the next two months at $25.25 Pittsburg, and of a lot of 1,000 tons at $25.50, for practically the same delivery. One large steel con-

sumer has been in the market the past few days for 10,000 tons of billets for 60-day delivery and has thus far been unable to place the same at pool prices, all the producers in a position to make this delivery asking an advance of 25 cents a ton.

The steel car plants are showing a little more activity. The plant of the Standard Steel Car Co., at Butler, Pa., which has been idle for some time is to resume next week to fill accumulated orders, while the Pressed Steel Car Co. will be in position to resume operations in some of its idle departments to fill the order for 1,000 steel gondolas placed by the Pittsburg & Lake Erie this week for delivery this year. The filling of this order will require about 10,000 tons of plates and structural shapes, and about 10,000 tons of miscellaneous castings and forgings.

The vote that is being taken by the Amalgamated Association on the reduction in wages in the sheet and tin mills will by no means have an overwhelming majority in favor of its acceptance. The returns of the majority of the lodges thus far show an adverse majority and those yet to be received will have to show a large majority the other way to insure the acceptance of the reduction. If the reduction is turned down a strike will be declared at all the sheet and tin plate mills of the American Sheet & Tin Plate Co. as well as at independent plants where a refusal to pay the scales existing prior to March 21 is made. While there have been many reports that the American Sheet & Tin Plate Co. has a large stock of tin plate on hand, jobbers and consumers declare that they are unable to secure anything like prompt shipments, while on new specifications deliveries of tin plate are not promised before May 1.

A meeting of the Lake Superior ore producers will be held next week at which some disposition of the question of ore prices and output for this year is to be made. In view of the recent improvement in the iron and steel trade it is believed that the reductions on both Bessemer and non-Bessemer ores will not be as great as at first proposed, but every effort will be made to prevent the accumulation of large stocks at lower lake ports. A meeting of the plate association is to be held in New York on April 7 and meetings of the structural and rail associations will also be held about the same time. A meeting of the executive committee of the billet association has been called for April 14, but no price changes are probable.

Pig Iron.—Transactions in foundry, forge and Bessemer iron have been limited in the past week, the bulk of the buying having been in small lots of foundry iron for early delivery. The market remains firm and on No. 2 foundry prices range from $13.85 to $14 Pittsburg. Quotations on Bessemer and forge iron remain unchanged. Quotations of Southern producers for Pittsburg delivery are again above those of Northern producers. The Southern furnaces generally quote $14.35, Pittsburg. We make the following quotations:

Bessemer, Valley	$13 35 to 13 50
Bessemer, Pittsburg	14 20 to 14 35
No. 1 Foundry	14 25 to 14 50
No. 2 Foundry	13 75 to 14 00
Gray forge, Pittsburg	13 25 to 13 50
Chilled basic, Valley	13 25 to 13 50
Chilled basic, Pittsburg	14 10 to 14 35

Steel.—Demand for billets, sheet and tin bars for delivery in the next sixty days is heavy and premiums of $1 to $1.50 a ton are being paid on bars, while billets command a premium of 25 cents a ton. A meeting of the executive committee of the billet association has been called for April 14 in New York, but no change in prices will be made. We quote the agreed schedule as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23, Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O., 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30 to $31, Pittsburg.

Ferro-Manganese.—Demand for ferro continues good and domestic 80 percent is held at $42.50 to $43, delivered at buyer's mill at any point east of the Mississippi.

Spelter.—The market is growing stronger and prices have advanced during the past few days. Prime Western grades are held at 5.05c to 5.10c, Pittsburg, in carload lots.

Muck Bar.—While little muck bar is moving, the demand is strong, and good neutral bars are held at $26.50 to $27, Pittsburg.

Skelp.—All of the skelp mills are running full on orders for delivery in the next ninety days. We quote grooved steel at 1.40c to 1.45c and sheared at 1.45c to 1.50c. Iron grooved is held at 1.50c to 1.55c, and sheared at 1.55c to 1.60c.

Rails and Track Material.—The placing of an order for 10,000 tons of rails by the Lehigh Valley, which has been held up for more than a year, is reported. Considerable new rail business is pending. The light rail market continues weak, all the lighter sections being held at $23, Pittsburg. The rerolling mills are not in position to meet this price which is being named by the large steel producers owing to the high prices now prevailing for old rails for rerolling purposes. This price of $23 is made by the mills despite the fact that the cost of rolling light sections is several dollars a ton greater than standards, for which they are now receiving $28. We quote: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 to 40 pounds, $23 to $24. Track material: Spikes, 1.65c to 1.70c.

Plates.—The order for 1,000 steel cars placed by the Pittsburg & Lake Erie railroad with the Pressed Steel Car Co. will require about 8,000 tons of plates. The resumption of operations at the Standard steel car plant will also stimulate the demand for plates to some extent and the plate situation is again looking somewhat brighter. We make the following quotations: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Structural Material.—No large orders for structural material have been placed in the past few days, although a steady run of small orders is being received by all the mills. Material to enter into the rebuilding of the destroyed sections of Baltimore is not yet in demand, and no contracts will be closed until the city authorities and the engineers can devise a plan of procedure in regard to the widening of the streets in the burned sections. Quotations remain: Beams and channels, 3 to 15 inches are quoted, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—Demand for sheets is improving and while some concessions continue to be made, few of the independents are shading prices. We quote black sheets as follows: No. 8, 1.80c to 1.85c; No. 9, 1.85c to 1.90c; Nos. 12-14, 1.95c; Nos. 15-17, 2c; Nos. 18-21, 2.05c; Nos. 22-24, 2.10c; Nos. 25-26, 2.15c; No. 27, 2.20c; No. 28, 2.30c; No. 29, 2.60c; No. 30, 2.70c. Galvanized: Nos. 12-17, 2.40c; Nos. 18-21, 2.55c; Nos. 22-24, 2.70c; Nos. 25-26, 2.90c; No. 27, 3.10c; No. 28, 3.30c; No. 29, 3.70c; No. 30, 4.10c.

Bars.—Specifications for iron and steel bars are heavy, although little new business is being closed. Bar iron is held on the basis of 1.40c to 1.45c, Pittsburg, for local delivery, while for Western shipment quotations are based on 1.35c, Pittsburg. Hoops are held at 1.40c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open-hearth, 1.40c; plow beams and cultivator beams, 1.35c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Pipes and Tubes.—Demand continues heavy for all kinds of pipe and tubing and all of the mills are operating at their utmost capacity. The outlook in the tube trade is unusually bright. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch	68	58	66	56
½ inch	71	61	69	59
¾ to 6 inch	75	65	73	63
7 to 12 inch	71	61	68	58
Ex. Stg., plain ends, ⅛ to 8 in.	67	57	64	54
Double Ex. Stg., pl. ends, ⅛ to 8 in.	59	49	56	46

BOILER TUBES.

	Steel.	Iron
1 to 1½ inch	42½	29
1¾ to 2¼ inch	55½	38
2½ inch	58	42
2¾ to 5 inch	64½	50½
6 to 12 inch	55½	38

Wire and Wire Nails.—An advance of 5 cents a keg was made on both iron and steel cut nails last week and a still further advance will be made at the meeting of the cut nail manufacturers to be held next week. Demand for wire nails and wire products is heavy and considerable new business is being placed. We revise quotations as follows: Wire nails, carload lots to jobbers, f. o. b. cars Pittsburg, $1.90 base, plain wire, carload lots, $1.80 base; barb wire, carload lots, $2.20 base; staples, carload lots, $2.05 keg. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.75, and less than carload lots, $1.80, f. o. b. Pittsburg, plus freight to point of destination. Terms, 60 days, less 2 per cent off in 10 days.

Merchant Steel.—Demand for all grades of merchant steel is improving, the manufacturers of crucible steels reporting a steady increase in demand, while the shafting manufacturers report that the tonnage on their books is quite heavy. Quotations are as follows: Cold rolled and ground shafting 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.50c, base; spring steel, 1.90c to 2c; toe calk, 1.85c, base. Tool steel is quoted 6 cents and upwards, according to the grade.

Old Material.—Demand for heavy melting stock and low phosphorus material is heavy and prices are steadily advancing. Heavy steel melting scrap is held at $14.25 to $14.50, gross tons, Pittsburg, while low phosphorus stock is held at $17.50 to $18, and one dealer has asked $19 gross ton for a lot of very desirable material. Dealers as well as steel mills will not sell their low phosphorus stock to steel casting manufacturers at the same prices at which they will offer it to large open-hearth steel plants and this action indicates that the steel producers are making every effort to keep the steel casting producers from making ingots and blooms and offering them to the trade at the present time as they did during the periods of high prices prevailing a year ago.

Coke.—A better supply of cars is being received by coke shippers in the Connellsville region, although the service is not nearly what is required to move the immense tonnage that is now wanted by the trade. Foundry coke for early shipment is held at prices ranging from $2.15 to $2.50, and furnace at $1.60 to $1.65. During the week ending Saturday, March 19, the production of the upper region amounted to 202,976 tons and the lower region 56,256 tons. The production showed an increase of about 10,000 tons during the week, while 400 additional ovens were fired.

CHICAGO.

OFFICE OF *The Iron Trade Review*
1115 MONADNOCK BLOCK, March 29.

The heavy buying of a few weeks back has abated considerably in the past ten days, and quietness prevails in nearly all departments of the iron and steel trade. There is a good tone to the market, however, and if new business is not of great proportions, specifications are coming in with a regularity and volume that indicates well sustained consumption in many lines. Consumers of those products which were affected by the recent advances had ample notice, and as they generally covered at the old prices the present lull does not come as a surprise. One feature of the local situation is the increased demand for plates, while the better demand for sheets is an element of strength in a product which has been in a ragged condition for some time. The local plate mill which started up two weeks ago with specifications for three days' operations on hand, has since received additional business that will keep it running for several weeks to come. Much of this tonnage came from car shops, though boiler manufacturers have taken material more liberally since the mild weather set in. Bar iron and merchant pipe keep up their record sales and producers of both products report their mills running to fullest capacity.

The coke situation is causing some anxiety to consumers in this territory owing to the greatly diminished shipments from Connellsville ovens on account of the car scarcity in that region, and there are urgent telegrams to rush material through. Prices have stiffened as a result, and good 72-hour foundry grades are now sold at $5 Chicago. Pig iron has shared in the dullness affecting other products and largely from the same causes. Northern and Southern grades are held respectively at $14 and $13.85 Chicago for No. 2 foundry, though some weakness has developed in Southern grades. Scrap continues firm despite the liberal offerings made by railroads and prices show no marked decline.

Pig Iron.—With the exception of a falling off in demand, there is little to report regarding the local pig iron situation. Sales during the week have been fewer in number and of smaller tonnage than in any previous week this month. The slow pace at which the spring trade is opening up may be responsible for this condition in a measure, the jobbing foundry trade in this section being very quiet just now. The fact also that a large number of melters covered for their second quarter's requirements before the advanced prices went into effect has had its influence in bringing about the present dullness, and a few weeks of quiet trading was not unexpected after the sharp edge of the buying movement had been taken off. Whether the new schedules will be maintained during the period of waiting which the market must go through is a matter of doubt in the minds of some sellers, though so far no shading is known to have been done. Several foundrymen who were in the market in the past week for various sized lots declined to purchase at the present Birmingham rates unless their views as to prices were at least met in part. Southern pig iron is not strong at $10 Birmingham in this city, and reports are current that this price has been shaded on recent quotations. The cut of 35 cents a ton in the freight rate from Ohio river points to Chicago has not improved the situation any, and its effect will be felt long after the rate is withdrawn on April 1. Northern irons are firm at the quotations given below, with furnaces in a very independent attitude as to the future:

Lake Superior Charcoal	$15 00 to 15 50
Northern Coke Foundry No. 1	14 25 to 14 50
Northern Coke Foundry No. 2	14 00 to 14 25
Northern Coke Foundry No. 3	13 50 to 14 00
Northern Scotch Foundry No. 1	14 50 to 14 75
Ohio Strong Softeners No. 1	15 30 to 15 80
Ohio Strong Softeners No. 2	14 80 to 15 30
Southern Coke Foundry No. 1	14 35
Southern Coke Foundry No. 2	13 85
Southern Coke Foundry No. 3	13 35
Southern Coke Foundry No. 4	12 85
Southern No. 1 Soft	14 35
Southern No. 2 Soft	13 85
Southern Gray Forge	12 10 to 12 60
Southern Mottled	11 85 to 12 35
Southern Silveries (4% to 6% Silicon)	14 85 to 15 35
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 00
Malleable Bessemer	14 00 to 14 50
Basic Iron	13 85 to 14 35

Billets.—Transactions have involved a fair tonnage in the past week and all producers are comfortably filled with orders. Prices are firm and there may be some settiment favorable to an advance at the next meeting of the billet association in April. We quote Bessemer and open-hearth billets, 4 x 4 and larger, up to .25 carbon, $24; up to

and including .60 carbon, $1 extra; over .60 carbon, $2 extra. Axle and forging billets smaller than 4 x 4, $25 Chicago. Open-hearth billets from store, $1.30 per 100 lb.

Iron and Steel Bars.—The consumption of iron and steel bars in the West, judged from the volume of specifications sent in daily, is exceptionally good, indicating an active trade in lines into which the material goes. New business in steel bars has not been heavy since the advanced quotations went into effect, but this was expected after the heavy buying at the old prices. Bar iron remains firm and the volume of new business keeps up to past proportions. Railroads have been sounding the market quite freely lately since most of them have reached the point where they have to buy material for new cars, etc., and a good tonnage is expected from this source in the near future. The price of 1.50c Chicago, which is asked by local mills, is being shaded from 50 cents to $10 a ton by manufacturers east of this city. Our prices are unchanged, and we quote mill shipments, carload lots, Chicago delivery: Bar iron, 1.45c to 1.50c, half extras; soft steel bars, 1.51½c, half extras, with 5c to 10c per 100 pounds extra for less than carload lots with the regular extras for less than a ton of a size; angles, less than 3 x 3 1.56½c base, half extras; hoops, 1.56½c, full extras. On lots from store, we quote iron and steel bars, 1.75c base; hoops, 2.10c rates.

Sheets.—The mild weather which has been felt for several days past has improved the demand for both black and galvanized sheets and there has been good buying of same during the week under review. Local producers are comfortably filled with orders and prices are not so uncertain as they were. The nominal quotations in this market are as follows: No. 27 black, 2.36½c to 2.41½c; No. 28, 2.41½c to 2.46½c, carload lots, mill shipments. Galvanized sheets, mill shipments, No. 27, 3.26½c to 3.31½c; No. 28, 3.36½c to 3.41½c. On small lots from store, we quote black sheets as follows: Nos. 8 and 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.30c to 2.35c; No. 16, 2.40c to 2.45c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.65c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.80c to 2.85c; No. 29, 2.95c to 3c; No. 30, 3.10c to 3.25c. Galvanized, 75 and 7½ percent.

Structural Steel.—Specifications for small lots have been received quite freely in the week past, but aside from this feature, the market presents no phase of interest. Mill prices are unchanged, and we quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; unvirsal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—The local interest reports a marked improvement in the demand for plates and it now has specifications on hand of sufficient tonnage to run its mill for several weeks. We quote carload lots, mill shipments, Chicago delivery: Tank steel, ¼ inch and heavier, 1.76½c; flange steel, 1.86½c; marine, 1.96½c; universal mill plate, 1.76½c to 1.81½c; 3-16 inch tank, 1.86½c; Nos. 7 and 8, 1.91½c; No. 9, 2.01½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel, ¼ inch and heavier, 2c; 3-16, 2.15c; No. 8, 2.20c; No. 10, 2.25c; flange steel, 2.35c, all f. o. b. warehouse.

Rails and Track Supplies.—Several orders for standard rails, ranging from 5,000 tons down, have been taken during the week, and specifications have been received in good volume. The demand for track supplies has also been very brisk. Prices are unchanged, and we quote heavy rails, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; 25-pound rails, $25 to $26; 12-pound rails, $26 to $28, with regular differentials for intermediate sizes. The following quotations on track supplies, which are f. o. b. Joliet mill, may be shaded on large orders: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.80c (out of store, 1.90c rates); track bolts, 3½ x ¾, with square nuts, 2.40c to 2.50c per 100 pounds; with hexagon nuts, 2.55c to 2.65c, with usual differentials for other sizes.

Merchant Steel.—The demand for agricultural products in the past week so far as new business was concerned, has not been active, though specifications on existing contracts have been freely sent in. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.30c and upwards, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½c to 8c; special tool steel, 12c and up. Cold rolled shafting, 52 percent from list in carload lots, and 47 per cent discount in less than car lots.

Cast Iron Pipe.—Demand is confined to the usual routine of small orders, big transactions being conspicuous by their absence in the week's sales. Prices, however, are very firm, and there is some talk of an early advance. We quote carload lots, Chicago delivery: 4-inch water pipe, $26; 6-inch to 12-inch, $25; larger sizes, $24; gas pipe $1 a ton higher.

Merchant Pipe.—There is no change to report, mills continuing to report their entire output is going into immediate consumption. Specifications are voluminous, a number of consumers anticipating their shipments. Prices are without change, and we quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guar. Wrought Iron.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¾ inch	66.35	56.35	64.35	54.35
½ inch	69.35	59.35	67.35	57.35
¾ to 6 inches	73.35	63.35	71.35	61.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—New business is quiet and specifications are difficult to obtain. The market is weak and the following prices which are for Chicago delivery are still being made:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	43.35	40.85	53.35
1¼ to 2¼ inch	55.85	38.35	40.35
2½ inch	58.35	43.35	40.35
2¾ inch to 5 inch	64.35	50.85	Up to 4 inches.
6 to 12 inch	55.85	38.35	48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	40	35	37.50
1¼ to 2½ inch	50	32.50	35
2¾ to 5 inch	60	45	Up to 4 inches.
6 to 12 inch	50	32.50	45

Wire Products.—The heavy storms throughout the entire West and Southwest in the last two weeks, destroying fences and barns, have brought an unusual demand for nails and field fencing, and the leading producer is snowed under with urgent requests for immediate shipment. Jobbers' stocks are being depleted faster than they can be renewed, and while all the company's mills are working to their fullest capacity, the output is not sufficient to meet the present pressing needs. Prices are without change, and we quote carload lots to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.86½c base; less than carload lots, 1.91½c; smooth wire, carloads, $2, and $2.05 for less than carload lots; galvanized smooth wire, $2.30 in carloads, and $2.35 in lesser amounts; painted barbed wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barbed wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads, and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount, f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—The car shortage in the Connellsville region which has seriously reduced the shipments of coke from that section to the West, is causing some anxiety among consumers in this territory. Deliveries are already

weeks behind, and despite the most urgent requests sent over the wire and through the mails it is almost impossible to get material through. Naturally prices of good Connellsville foundry coke have stiffened and it is now selling at a minimum of $5 Chicago, with better prices than this asked for immediate delivery where it can be obtained. Virginia and West Virginia grades are selling freely as a result of the scarcity of the Connellsville product, and the prices of the latter range from $2 to $2.25 at the ovens. The Milwaukee Coke & Gas Co. will start up its ovens in Milwaukee this week, and is taking orders in this market for Solvay coke at $5 Chicago.

Old Material.—There is little demand for scrap, though prices are maintained fairly well. While it is true that mills have a good supply on hand or contracted, the special lots required from time to time keep up a good running inquiry and there is plenty of life to the local trade. Railroads have been offering material quite freely in the past week and about 2,500 tons have been disposed of to local dealers in the past week. We have revised some of our prices, and quote dealers' selling prices, gross tons, as follows:

Old iron rails	$16 50 to 17 00
Old steel rails (mixed lengths)	11 75 to 12 25
Old steel rails (long lengths)	13 00 to 13 50
Relaying rails	23 00 to 24 00
Old wheels	14 50 to 14 75
Heavy melting steel	11 50 to 12 00
Mixed country steel	9 50 to 10 00

The following are selling prices for net tons:

Low phosphorus scrap (.04 and under)	12 00 to 12 50
No. 1 R. R. wrought	13 00 to 13 50
No. 2 R. R. wrought	12 00 to 12 50
Shafting	13 50 to 14 00
Dealers' forge No. 1	9 75 to 10 25
No. 1 busheling and wrought pipe	9 00 to 9 50
No. 1 cast	12 00 to 12 50
Heavy cast (300 pounds and over)	8 50 to 9 25
Agricultural malleable	9 00 to 9 50
Iron axles	16 50 to 17 00
Steel axles	15 00 to 16 00
No. 1 boilers, cut	8 50 to 9 00
Cast borings	5 00 to 5 50
Mixed borings, etc.	5 00 to 5 50
Wrought turnings	7 25 to 7 75
Machine shop turnings	7 25 to 7 75
Iron axle turnings	8 25 to 8 75
Steel axle turnings	8 25 to 8 75
Stove plate and light cast scrap	9 50 to 10 00
Old iron splice bars	13 00 to 13 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, March 29.

Iron Ore.—Owing to the inability of several representatives of ore interests to attend the meeting which was announced for April 1, the time has been changed to April 7, when it is expected the meeting will be held in New York. The most serious difference of opinion between the two parties into which the ore producers have divided relates to the amounts of ore to be mined by the various interests. The United States Steel Corporation, two producing-consuming interests and one large producer, representing in all about 85 percent of the ore tonnage, favor making the actual sales of each producer, before the ore is shipped from the mines, the amount he shall bring down. They contend that this arrangement would be fair and would prevent the shipping of a large amount of unsold ore, as was done last year. They argue that the proposal of those who do not favor this plan would compel the steel corporation so to restrict its production that it would have to buy from 2,000,000 to 3,000,000 tons of ore from other companies. This the corporation, with its large ore reserves, does not feel warranted in doing.

The position of the merchant ore men, which has already been explained in this column, is that any agreement on price, without stringent regulation of output, would not be effective in a year like the present, in which the merchant demand may be counted on to go much below that of recent years. Furthermore these firms emphasize the identity of their interests in a year like 1904 with the merchant furnaces who, they concede, must have a low price, particularly on non-Bessemer ores in view of the strong competition now evident between the Northern and Southern producers of foundry iron.

On the whole the outlook is still unfavorable for an agreement this year, and it is asserted that if there is none this year the prospects of an association in future years will be much lessened by the results of an open market. It is understood that the Steel Corporation considers its policy of refraining from making any sales of ore is of direct benefit to the merchant ore interests, as are its purchases of pig iron from merchant furnace firms, which in turn buy the ore for this iron to a considerable extent from the merchant ore companies. It has been intimated that in case no agreement on ore prices is made this year the corporation's policy may be modified to the extent of confining its pig iron purchases to furnace companies which will buy ores for this iron from the corporation, making such transactions really ore and coke conversion deals.

There is no selling of ores apart from some resales from the docks, and it is the understanding that the status quo will be maintained until after the April meeting.

Conferences between the dock managers and representatives of the longshoremen are in progress, the former favoring a reduction in wages and the latter contending for last year's scale. It is not expected that an agreement will be reached for several days.

Pig Iron.—The market is firm and there is a fair demand. No Valley furnaces are now willing to sell No. 2 below $13 at their plants. The local market is stronger, the price now being $13.50 at the furnace for No. 2. Southern iron is selling at $9.75 for No. 2 The facts in regard to recent reductions in freight rates from Birmingham to Northern cities are not entirely clear, as conflicting statements have been made. The reduction of the Chicago rate was first made by a railroad which claimed it was not getting its share of the tonnage and it is asserted that the general manager who made the reduction has been ordered by the board of directors of the railroad to restore the old rate April 1. We quote as follows for Cleveland delivery, save on Northern gray forge, which is at Valley furnace:

Bessemer	$14 30 to 14 35
No. 1 Strong Foundry	13 65 to 13 90
No. 2 Strong Foundry	13 50 to 13 75
No. 3 Foundry	12 40 to 12 75
No. 2 Southern	13 60 to 13 85
Gray Forge, Valley furnace	13 25 to 13 75
Gray Forge, Southern	13 25 to 13 60
Lake Superior charcoal	14 75 to 15 00

Finished Material.—Specifications on contracts for steel bars required before the recent advance from 1.30c to 1.35c for Bessemer, are coming in freely, and a few sales at the new price are being made. Bar iron at 1.35c Pittsburg is dull, but the price is being maintained. The demand for structural material is not as strong as sellers expected it would be toward spring. Very low quotations have recently been made in sheets, some prices being $3 per ton lower than those of the principal producer. There has, however, been much complaint on the part of buyers that mills naming low quotations have not given deliveries as agreed and low prices often do not result in sales. Prices of the principal producer through jobbers are as follows: Mill sales of black sheets, No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.20c; No. 28, 2.30c. Galvanized, 80, and 3 off. Out of stock prices are as follows: No 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No 30, 3.10c. Galvanized out of stock, 75, 10 and 5 off.

Old Material.—The market is firm. It is difficult to buy iron rails at less than $20. Wrought turnings, busheling and cast borings have advanced from 20 cents to $1. We quote as follows for gross tons, Cleveland:

Old iron rails	$19 50 to 20 00
Old steel rails (over 6 feet)	14 00 to 14 50
Old steel rails (6 feet and under)	13 50 to 14 00
Old car wheels	13 00 to 14 00
Steel boiler plates	10 00 to 11 00
Malleable iron (railroad)	12 50 to 13 00
Malleable iron (agricultural)	10 00 to 10 50
Heavy steel	14 00 to 14 50

We quote the following net tons:

No. 1 R. R. Wrought	$14 00 to 15 00
No. 1 busheling	11 50 to 12 00
No. 1 machine cast scrap	11 50 to 12 00
Iron axles	16 50 to 17 50
Axle turnings	9 00 to 10 00

Wrought turnings (free from cast)	8 25 to 8 50
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	9 00 to 10 00
Pipes and flues (clean)	10 50 to 11 50
Tank iron	9 50 to 10 50
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00
Wrought drillings	7 00 to 8 00
Stove Plate	9 50 to 10 50
Steel axles	14 00 to 15 00
Cast borings	5 50 to 6 00

The Bourne-Fuller Co., Cleveland, has decided to add boiler tubes to its line and is building an addition to its warehouse in which a large stock will be kept.

CINCINNATI.

March 29.

There continues to be a fairly good demand for coke and the market is steady at previous prices. Foundry coke is selling on contracts $2 to $2.25 per ton f. o. b. ovens, but for quick shipment a slight premium is obtained in some instances.

Pig Iron.—There has been fair activity in the market again this week and a good steady tone prevails. The few large transactions brought out some inside prices which it was thought were rather hard to obtain at the close of last week. The most notable purchase was made by an Ohio company making agricultural implements. This was for delivery in the last half of the year and covered several brands. It is said that in all the concern bought 6,000 tons. This was divided between Northern and Southern irons. Some of the Southern sold at $10 Birmingham for No. 2 and some of the Northern went at $12.50 furnace for No. 2. A few brands brought a premium above minimum prices as it was wanted in the mixtures. Some Virginia iron in the same purchase sold at equal to $10.50 Birmingham for No. 2 and some Ohio iron sold at $13 furnace. A pipe maker is credited with buying 3,000 tons at $9.75 for No. 2 and $9.25 for No. 3 for second quarter delivery. Another sale of 3,000 of Northern iron at $12.50 Ohio furnace for No. 2 is reported. An Indiana concern bought 1,000 tons of malleable pig iron from a Northern furnace. The general run of orders has been fairly good and prices are steady. While some scattering sales have been made at $9.75 Birmingham for No. 2 there has been a quite general adherence to the $10 basis The trade is not talking any further advance at this time; in fact, there seems to be a feeling of satisfaction that the advance has been so well maintained. There is growing belief that the melt of foundry irons is increasing and that the whole situation has a healthy tone. The placing of the order above referred to for delivery in the second half of the year brought out the fact that some of the Southern makers did not care to quote at all on the business and one refused to quote at less than $11 basis. A little more gray forge has come into sight in the offerings and the market is slightly easier on this grade. No. 2 soft is still scarce and is therefore relatively firmer than the other grades. Current prices f. o. b. Cincinnati are:

Southern Foundry No. 1	$13 00 to 13 25
Southern Foundry No. 2	12 50 to 12 75
Southern Foundry No. 3	12 00 to 12 25
Southern Foundry No. 4	11 50 to 11 75
Southern Foundry No. 1 soft	13 00 to 13 25
Southern Foundry No. 2 soft	12 50 to 12 75
Gray forge	11 25 to 11 50
Northern Foundry No. 1	14 15 to 14 65
Northern Foundry No. 2	13 65 to 14 15
Northern Silvery (8% silicon)	16 15 to 16 65
Southern car wheel iron	16 75 to 17 00

Finished Material.—There has been no change in the situation the past week and the demand for nearly everything on the list is moderately active in a jobbing way except for plates. Plates are dull and draggy. Jobbers still complain of slowness on the part of mills in filling orders and poor time made by railroads in getting the goods to destination. Prices are steady for all classes of material. Bar iron is quoted at 1.40c f. o. b. Steel bars are advanced to 1.48c base, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.80c; No. 27, 2.70c; No. 16, 2.45c; No. 14, 2.35c; No. 12, 2.30c; No. 10, 2.25c. Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c for 3-16 inch. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.90c to 2c for base sizes.

Merchant Pipe.—Trade is quiet and specifications are rather moderate. There are no important price disturbances and the little business going is at schedule figures. Car load lots are quoted as follows, f. o. b. Cincinnati:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	64.7	54.7
½ inch	69.7	59.7	67.7	57.7
¾ to 6 inch, inclusive	73.7	63.7	71.7	61.7
7 to 12 inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—There is not much activity in the market and sellers are not offering freely. There is a disposition to hold for better prices on the part of all interests. Railroads are not selling at this time with any freedom. We quote:

Old No. 1 railroad wrought, net tons	$11 50 to 12 00
Cast machine and foundry, net tons	11 00 to 11 50
Old iron rails, gross tons	16 00 to 16 50
Old steel rails, gross tons	12 50 to 13 00
Old short lengths, gross tons	11 00 to 12 00
Old iron axles, net tons	15 50 to 16 50
Stove plate, net tons	9 50 to 10 50
Wrought turnings, net tons	7 50 to 8 00
Cast borings, net tons	4 50 to 5 50

NEW YORK.

OFFICE OF *The Iron Trade Review*.
ROOM 1909, NO. 150 NASSAU ST., March 29

General Manager McQueen, of the Sloss-Sheffield Steel & Iron Co., has been in the city for the past few days. He said today to your correspondent: "Our company has sold over 95,000 tons of iron since March 1, and this fact has made me take a very hopeful view of the future. I cannot say that I take an optimistic view of the outlook, but I do think that present prices are going to hold. Our company will follow the market. I was much surprised to see how greatly business is tied up around here. Foundrymen tell me they are only doing a fair business, and the building trade in New York seems to be in a state of turmoil again, which is going to be bad for the iron market." Mr. McQueen said there were no new developments in the proposed merger of his company with the Tennessee and Republic companies, and that there would be none probably for several months. The experts are still at work in the matter.

Pig Iron.—During the past week the pig iron market in this vicinity has been quiet. Only a fair tonnage has been booked, with Southern irons leading in point of activity. For Southern No. 2 foundry $10 Birmingham is the prevailing figure, although there are reports that a shade better can be done in some out-of-town centers. The average consumer of Southern irons does not take kindly to the $10 schedule, and contents himself with purchasing only to the extent of his immediate requirements. It is noteworthy that even among sellers the belief is that prices are not likely to go higher for the second quarter. Current buying invariably calls for immediate shipment, but a small tonnage has been placed for delivery to July 1. In Northern irons there has been a fair volume of orders, and prices have remained unchanged. Outside of the castings for the Pennsylvania tunnel, the orders for which are likely to be placed within a week or ten days, there are very few inquiries of any note in the market. New York prices are as follows: Northern No. 1 X, $15.50 to $15.95; No. 2 X, $14.75 to $15.20; No. 2 plain, $14.50 to $14.95; Southern No 1 foundry, $14 to $14.25; No. 2 foundry, $13.25 to $13.75; No. 3 foundry, $12.75 to $13.25; No. 4 foundry, $12.25 to $12.75.

Rails.—There is nothing of interest to report, and the situation is a featureless one. Standard sections are $28 at mill.

Finished Iron and Steel.—The American Bridge Co.

closed during the week a contract for 4,000 tons for the College of the City of New York, and one for 700 tons with the Ft. Worth & Denver City railroad. An official of the company says that proposed enterprises in New York City alone, calling for 50,000 tons—this estimate including no contract for less than several thousand tons—are held up because the projectors cannot get the money to go ahead. If smaller contracts were considered, the tonnage would be much larger. The building trade labor situation in this city is very serious, and structural material men at this writing expect the industry to be almost as completely paralyzed as it was last spring. Structural shapes for railroad bridge work are slow, but proposed bridge improvement by the authorities of Brooklyn will require 2,000 tons. Plates continue in fair demand, and it will not require many more orders to keep the mills pretty busy during the spring season. The orders for 2,000 tons of plates required by New York City in the construction of three new ferryboats are not likely to be placed for some time, as the lowest bids for the boats, submitted yesterday, are about one-third larger than the appropriation calls for. Sheets are fairly active, and prices are firm. In both iron and steel bars conditions are favorable, and higher prices are being predicted. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron bars, 1.50c to 1.55c; soft steel bars, 1.50c to 1.55c; steel sheets, in carloads, New York, No. 28 black, 2.45 to 2.50c; galvanized, 3.50c to 3.55c.

PHILADELPHIA.

March 29.

The demand in nearly all lines continues strong and prices are firm. The output of pig iron is being rapidly increased and it is doubtful whether prices can be maintained.

Pig Iron.—Demand is heavy. Prices are firm, but are not, as a rule, higher. Basic pig has been selling at $14, delivered. Northern No. 2 X ordinarily sells at $15.25 and Southern No. 2 at $10 Birmingham. Delivery of Southern iron has been slow. We quote as follows: No. 1 X foundry, $15.75 to $16; No. 2 X foundry, $15 to $15.50; No. 2 plain, $14.25 to $14.75; gray forge, $13.25 to $13.75; basic, $13.75 to $14; Southern No. 2 X, $14 to $14.50.

Steel.—Demand is strong at $25. Mills have enough orders to insure regular operation for two months.

Finished Material.—The demand is irregular, being much better for bars than for plates. The expected demand for shapes for the rebuilding of Baltimore is not yet in evidence and little is being done in structural material. We quote: Best refined bar iron, $1.48½ to $1.50; tank plates, steel, $1.73½; angles, $1.50 to $1.60; beams, channels for 15 inch and over, $1.73½.

Old Material.—Holders are firm, but the demand is not quite so strong. We quote: Old steel rails, $15 to $15.50; miscellaneous heavy steel, $14.50 to $15; low phosphorus scrap, $18.50 to $19.50; old steel axles, $18 to $19; old iron axles, $21 to $22; old iron rails, $18 to $18.50; old car wheels, $13.50 to $14.50; choice railroad No. 1 wrought, $18 to $19; country scrap, $16 to $17; machinery cast, $13.50 to $14; No. 2 light scrap (forge), $12 to $13; No. 2 light scrap (ordinary), $10.50 to $11; axle turnings, $10.50 to $11; wrought turnings, $9.75 to $10; cast borings, $7.50 to $7.75; stove plate, $12 to $12.50; wrought iron pipe, $12.75 to $13.25; boiler punchings, $15.50 to $16.50.

BIRMINGHAM, ALA.

March 29

Birmingham, Ala., March 28.—While the quotation of $10 per ton for No. 2 foundry iron has had the effect of checking the demand, pig iron market conditions in the Southern territory are very healthy. Not only does pig iron look up in the Southern section but rolled material, cast iron pipe and other products. The Sloss-Sheffield Steel & Iron Co. is out of the market for delivery within the next two months at least, for No. 2 soft, Nos. 2 and 3 foundry. Other manufacturing companies in this district are also out of the market as far as certain grades go. The aggregate of sales made during March will go far above 150,000 tons, deliveries to be made during the next three months. Some of the companies in the Birmingham district have informed selling agents that they are not to push for business. The lower grades of iron were in strong demand in March, single orders being for 5,000 tons and more.

The production in this section is holding up well. The Republic Iron & Steel Co. will blow in its No. 1 furnace at Thomas this week. It is expected to have a daily capacity of 250 tons. It has been thoroughly repaired; in fact the improvements equal a rebuilding. The Tennessee Coal, Iron & Railroad Co. has one furnace at Ensley almost ready for the torch.

The following quotations are given by Southern manufacturers: No. 1 foundry, $10.50; No. 2 foundry, $10; No. 3 foundry, $9.50; No. 4 foundry, $9; gray forge, $8.75 to $9; No. 1 soft, $10.50; No. 2 soft, $10.

In finished iron the reports are favorable though the trade does not warrant a resumption of work at the big Birmingham rolling mills, which belong to the Republic Iron & Steel Co. The Gate City mills, belonging to the same company, are working steadily. The Tennessee Coal, Iron & Railrfoad Co. has settled all differences with labor in the bar mill department of the Bessemer rolling mills and all departments are now in full operation.

The steel plant of the Tennessee Coal, Iron & Railroad Co. is again working almost full in all departments, steel rails being almost the exclusive product. Southern railroads are being supplied with rails for new work and extensions.

Cast iron pipe foundries report steady business, fine prospects and fairly good prices. The Dimmick Pipe Co., at North Birmingham, is delivering on an order for 10,000 tons of cast iron pipe for St. Louis. The United States Cast Iron Pipe & Foundry Co. is shipping steadily from its Bessemer plant. It is stated hereabouts that Cuba and Mexico will be in the market in the very near future for cast iron pipe and that Southern plants will no doubt have the advantage on this business.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., March 29.

Pig Tin.—During the week speculative interests on the continent had the metal completely under their control and after boosting prices up they unloaded freely, with the result that prices abroad have suffered a serious decline. The domestic situation is a listless one, and were it not for manipulation prices would undoubtyedly be lower than they are. Declines in London for the week aggregate about £1¾. Closing prices at the Metal Exchange today follow: Spot and March, 28¼c to 28½c; April, 28.15c to 28.40c. London's closings today follow. Spot, £128 10s. Futures, £128 12s 6d. Arrivals at Atlantic ports for the month aggregate 3,781 tons, with 3,047 tons afloat.

Copper.—There was a further advance of ⅛c in the "official" prices for all grades during the week, due to an increased demand from the country, and manipulation abroad. The feeling in trade circles is a little more hopeful than it has been, but the fact that production is increasing is thought not to augur well for any considerable advance in prices. London during the week has been quite active, but closing prices today are lower than they were a week ago today. Closing prices at the Metal Exchange today follow: Lake and electrolytic, 12⅞ to 13c; casting, 12⅝ to 12¾c. London's closings today follow: Spot, £57 15s; futures, £57 10s. Exports for the month to date aggregate 19,123 tons, with 12,172 tons afloat.

Lead.—Is firm and unchanged at 4.60c to 4.65c. St. Louis is easier at 4.42½c to 4.45c. London is higher at £12 5s.

Spelter.—Is considerably stronger at 5.15c to 5.25c. St. Louis advanced to 4.90c. London is stronger at £22.

Antimony.—All makes are steady. Cookson's is 7¾c to

8c; Hallet's, 7¼c to 7½c; other grades, 6¼c to 6½c.

Quicksilver.—We quote $46 per flask of 76½ pounds in lots of 100 flasks. London is £8 5s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c and 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, March 29.

The local metal market is quiet and demand is of small proportions. Prices are firm, and with the exception of sheet zinc and tin are unchanged. The former has been advanced to 5.75c per 100 lb. for 600-lb. casks, with 20c advance for less than carload lots. Pig tin has weakened, and is now selling at 29¾c for carlots, and 30¼c for lesser quantities. We quote Lake, 13c to 13¼c for carload lots, and 13⅜c to 13¾c for less than carload lots; casting, carloads, 12¾c to 13c; for lesser lots, 13¾c to 13½c. Pig lead, 4.45c in carload lots and 4.50c to 4.55c in lesser quantities. Spelter, 5c carloads, and 5¼c to 6c for lesser amounts. Antimony, 8½c to 8¾c for Cookson's, and 7¼c to 7½c for Hallett's. Nickel, 45c to 60c, according to amount and deliveries.

Buying prices of old metals are as follows: Copper wire and heavy, 11c; copper bottoms, 10c; copper clips, 10½c; red brass, 9⅞c; yellow brass (heavy), 7¾c; yellow brass borings, 6c; red brass borings, 8c; light brass, 5½c; pipe lead, 3.90c; tea lead, 3⅜c.

The Flue Dust Decision at Pittsburg.

(Special Telegram.)

PITTSBURG, March 30.—While the Supreme Court of Pennsylvania has done nothing as yet towards granting the Jones & Laughlin Steel Co. an extension of time in which to make changes in its furnaces which will obviate the discharge of large clouds of ore dust, it is believed that the court will be asked to grant such an extension. Legal authorities state that the case cannot be carried to the United States Supreme Court and that the decision of the Pennsylvania court is final. The far reaching effects of the decision are apparent, as residents of Allegheny are already complaining of the dust discharges of one of the Allegheny furnaces of the United States Steel Corporation. In the meantime the furnaces of the Jones & Laughlin Steel Co. are being operated, but every effort is being made, as heretofore, to prevent slips and explosions.

Ore Shipments From the Baraboo Range.

CHICAGO, March 29.—The International Harvester Co. made its first shipment of iron ore from its mines on the Baraboo range, Sauk county, Wis., on March 7, and for the balance of the year an average of 250 tons per day will be shipped to the company's furnaces at South Deering, Ill. Twenty-five thousand tons of ore is in the stock piles at the mines, from which the first shipments were made. The company expects to take out 100,000 tons of ore from this range during the year, and it is authoritatively stated that mining operations will be recommenced in the early part of April. The shipment was made by all rail from North Freedom, Sauk county, over the Chicago & Northwestern tracks, 182 miles from Chicago, the route by which all the ore from these mines will be brought to the furnaces. The company is well fortified with ore properties on the three ranges, having the Hawkins and Agnew mines on the Mesabi, two in the Crystal Falls district of the Menominee range and about 640 acres, controlled either by lease or option, on the Baraboo range, on all of which has been developed a total of over 35,000,000 tons of ore of Bessemer and non-Bessemer grades, enough to supply its requirements for the next fifty years.

The Ashland Sheet Mill Co.'s plant at Ashland, Ky., closed down pending the decision of the Amalgamated Association on the proposed reduction in sheet mill wages.

The Cambria Steel Co. announces that it has added steel rivets to its line of products.

The machine shop of the Pittsburg Valve, Foundry & Construction Co., Pittsburg, was destroyed by fire March 29, with a loss of over $100,000. The remainder of the plant escaped damage. The machine shop was one of the finest of its kind in the country and contained much special machinery.

"HOW TO KEEP BUSY IN DULL TIMES."

At the last meeting of the Cincinnati Metal Trades Association Philip Fosdick, of the Fosdick Machine Tool Co., made an interesting address on "How to Keep Busy in Dull Times." Mr. Fosdick recommended the diversifying of the shops to some extent instead of such high specialization as now carried on. He called attention to the many opportunities that were open in Cincinnati for factory enterprise which had seemingly been neglected. On this point he said in part:

"Cincinnati leads the world in wood and iron working machinery. We make immense quantities of soap; we compete with the world on buggies, harness, tobacco, shoes, brass goods, pianos, hides, leather, beer, whisky, springs and axles, pumps, playing cards, safes, lithograph work, printing inks, furniture and office appliances, candles, clothing and hundreds of other articles. And if Cincinnati is a suitable place for the manufacture of machine tools and all the other things I have mentioned, it is just as good for manufacturing things in which we are deficient. Take, for instance, stationary engines. I venture to say that either Indianapolis or Erie builds ten times as many engines as all of Cincinnati combined. Why cannot Cincinnati build locomotives? I never heard of one being built here. Why is it necessary when buildings like the National Trust and the Traction building are planned that we have to go outside of Cincinnati for architects and contractors?

"New cotton mills are being constantly erected in the South and when they buy their machinery they don't come to Cincinnati because it is not made here. Hundreds of thousands of dollars' worth of steel castings is used in Cincinnati each year, but not a pound is made here. Other cities further than we are from the raw material have blast furnaces. I know of none in Cincinnati. We have no steel mills; no mining machinery is built in Cincinnati, no wire rope, no drop forgings, no guns. Automobiles are built in large quantities in nearly every large city in the United States except Cincinnati.

"Hundreds of factories in Cincinnati use electric cranes, but they don't buy them at home. We make no emery wheels, no drop forgings, no chucks, no wheelbarrows. And while millions of dollars are expended for agricultural machinery each year, not a dollar's worth is manufactured here. No blowers of any kind are made in Cincinanti. Not a lawn-mower is manufactured within our gates. Thousands of printing presses, large and small, are in operation in the Queen City, but they are made in Chicago, New York, or some city other than Cincinnati. There are many other industries which would flourish in our city and if many of our capitalists, instead of investing their money in 3 percent bonds or buying large blocks of amalgamated copper and steel common, with the only satisfaction of watching a new record every day, would pay some attention to the manufacturing industries, both they and the city would be better off and Wall street would have to forego its daily diet of spring lamb with Cincinnati sauce."

The lack of many industries in Cincinnati which should seek that location for its exceptional advantages in labor was alluded to. On this feature the speaker referred to the large German population in this city. The tendency of the Germans is to put their boys to work. "These German boys go to work at an early age, stick to it and by the time they are men they are skilled mechanics, making good wages and are perfectly satisfied and contented. If it were not for the labor agitation and the walking delegate going around to stir up trouble, such things as strikes would never be heard of in Cincinnati. We may have some trouble here but the life of a manufacturer in Cincinnati, compared with one in Chicago, is one grand sweet song."

Mr. Fosdick cautioned manufacturers against extravagance in times of prosperity. "When times are good and every factory has more than it can do, it is not wise for manufacturers to put all the money they make in new equipment, bricks and mortar, but it is much better to put the excess profits into a sinking fund and advance prices, keeping their shops the same size. This money saved, instead of being put in new equipment and the additional profits accruing from an advance in prices would furnish sufficient capital to enable the manufacturer to reduce his working force, maintain prices and take things easy until the business of the country came back to its normal state."

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MARCH 31, 1904

DEVELOPMENTS IN IRON AND MACHINERY.

The attitude of the railroads has not changed essentially since the beginning of the year, although the Pennsylvania Railroad has placed the general contracts for the construction of the tunnels to be driven under the East and North Rivers and Manhattan Island. The Pennsylvania enterprise, among railroads, however, must be considered extraordinary and an exception rather than the rule.

The iron and steel trade in its many branches will be a large beneficiary from the tunnel work, as many subcontracts will be let. The first of any importance is about to be placed and embraces 52,000 tons of iron castings, which is about one-third of the full tonnage required in the construction of the North River section. It is estimated that about $2,000,000 will be expended in the purchasing of various kinds of machinery in connection with the power plants to be built in New Jersey and on Long Island to provide not only for the construction of the tunnel, but for the operation of the trains, upon completion. Other substantial contracts for machine tools and power equipment have been placed recently, introducing the long expected animation looked for by manufacturers of standard and special machinery.

One important feature is the large share which electrically driven machinery and tools are taking in the contracts already placed and pending. Electrical railway enterprises also are developing to an unexpected degree.

Municipal contracts for the extension of waterworks and fire systems are being favorably considered and will be productive of large orders for hydraulic machinery and cast iron water pipe within the next few months. The Jerome Park enterprise and the high-pressure salt water fire system at New York City alone will call for the consumption of about 300,000 tons of cast iron pipe if present plans reach maturity.

While domestic business in iron and steel products—from the crude to the fabricated material—is reaching a magnitude little thought of during the recent depression, there is also an encouraging increase in the export trade. The development in the copper mining industry in South America, Mexico and Canada, as well as in the United States, is calling for large quantities of mining machinery. American manufacturers of agricultural implements recently have made large shipments of tools to the Latin-American countries, while Japan, under the pressure caused by the war, is calling for prompt shipments of various supplies, including machine tools and metals.

It is a fact of some significance that the steel products in which there has been the greatest activity, are those for which prices were reduced last fall. Rails and plates and even heavy structural material, prices for which were maintained, have been relatively slow, as the trade cannot be stimulated by advancing prices, already high, and railroads, that are the largest consumers of such material, will not purchase freely at the present level. The rail and plate mills are still hungry and are likely to experience a lean year. There is much difference of opinion on the question whether a greater profit would have accrued from accepting a large volume of business at low prices than in maintaining prices and selling only a portion of the capacity of the mills. Recent developments seem to indicate that the former policy would have been the better.

There seems reason to believe that all branches of iron and steel industry—with the possible exception of rails, plates and heavy structural material—will continue to share in improved feeling and in a large volume of business during the third quarter of the year. The machinery industry, especially, from present indications, will reap a good harvest of orders from the development of such large enterprises as the Panama Canal, the Erie Canal, and municipal work, supplemented by a general betterment in small industries.

CONTINUED INCREASE OF EXPORTS.

Imports of iron and steel continue to decrease while exports show a very fair increase as reported to the Department of Commerce. Comparing the eight months ending February, 1903, with eight months ending February, 1904, we have the following:

IMPORTS OF PIG IRON AND CRUDE STEEL—GROSS TONS.

	Pig Iron.		Steel.	
	1902-3	1903-4	1902-3	1903-4
July	56,127	38,046	37,150	33,082
August	79,447	40,475	39,027	20,380
September	82,196	16,414	27,726	13,530
October	67,204	18,704	32,036	10,343
November	100,400	18,765	41,077	6,580
December	118,373	14,719	26,230	1,425
January	110,679	10,812	38,691	1,860
February	45,187	3,841	20,151	1,514
Total	659,613	161,776	262,088	88,714

The exports of steel rails last month were 8,465 tons against 523 tons in February, 1903, and 4,960 tons in January, 1903. The exports of billets, ingots and blooms show an increase from 317 tons in February, 1903, and 17,184 tons in January, 1904, to 26,205 tons last month. Other exports than rails and crude steel have changed very little as compared with January. The totals for items included in the table are: January, 1904, 49,876 tons; February, 1904, 57,546 tons. The detailed exports of which the tonnage is reported are as follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	February		8 mos. end'g Feb.	
	1903.	1904.	1903.	1904.
Pig iron	876	3,429	13,048	23,095
Scrap	197	1,443	4,120	9,073
Bar iron	267	1,687	6,658	10,962
Wire rods	1,416	513	19,390	8,926
Steel bars (not wire rods)	3,670	704	9,815	9,973
Iron rails	2	12	47	752
Steel rails	523	8,465	19,769	39,977
Billets, ingots and blooms	317	26,205	1,829	48,182
Hoop, band and scroll iron	96	383	775	1,595
Iron sheets and plates	102	69	1,892	3,808
Steel sheets and plates	808	808	8,242	8,292
Tin plates, terne plates and taggers' tin	25	77	650	328
Structural material	3,114	2,950	22,805	19,971
Wire	7,646	8,041	60,009	70,046
Cut nails	775	737	4,455	6,408
Wire nails	1,765	1,786	17,757	21,716
Other nails, including tacks	127	237	1,658	1,594
Total	21,726	57,546	189,805	284,698

There were no exports of iron ore last month, while in February, 1903, the exports were 728 tons. For the eight months, the exports of ore were 75,385 tons for 1904 and 73,107 for 1903. The value of exports, excluding ore but including machinery and other items of which the tonnage is not returned, was $8,761,257 for February, 1904, against $8,171,738 for last January and $6,924,231, for February, 1903. For the eight months, the values were: $67,887,037 in 1904, $62,922,173 in 1903, and $64,675,523 in 1902.

The total value of imports of iron and steel, excluding ore, but including a number of lines in which tonnage is not ascertainable, was $1,551,967 for last month against $3,313,010 in February, 1903. The value for the eight months was: $19,444,683 in 1904, $34,558, 990 in 1903, and $15,727,934 in 1902. Iron ore imports were 27,853 tons in February, 1904, against 64,378 in February of last year. The tonnage table of imports on articles named follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	February		8 mos. ending Feb.	
	1903.	1904.	1903.	1904.
Pig iron	45,187	3,841	659,613	161,776
Scrap	4,50	316	90,617	21,197
Bar iron	2,646	706	30,459	24,248
Iron and steel rails	19,804	7,944	75,009	32,595
Hoop, band or scroll	117	82	1,062	1,577
Steel ingots, slabs, billets or bars	20,151	1,514	262,088	88,714
Sheets and plates	206	1,032	5,508	8,987
Tin and terne plates	4,026	3,214	32,914	30,528
Wire rods	1,224	1,700	15,698	13,450
Wire and wire articles	252	325	2,039	3,501
Structural shapes*		1,512		10,926
Total	97,863	22,186	1,175,041	397,496

*Not reported separately prior to July 1, 1903.

THE PROBLEM OF FURNACE "SLIPS."

The injunction granted on Monday, March 28, against the Jones & Laughlin Steel Co. by the Supreme Court of Pennsylvania, to restrain it from permitting its furnaces to distribute ore dust upon near-by residential property, will doubtless give a decided impetus to the study of this subject. The surprising feature of the matter as it stands today is that while there is ample evidence from technical men whose word must carry great weight, and from practical men who have succeeded, that the ore dust problem can be solved, a great difference of opinion exists as to how this should be accomplished. Broadly speaking, the means advocated are a greater slope to the walls of the furnace above the bosh, a closed top, and a special system of charging the different materials.

We find the adherents of one means decrying the utility or advisability of another, and it is evident that if in the march of progress one means meets with universal commercial adoption, it will only be after much additional work and discussion. Testimony conclusive so far as it goes is furnished by A. J. Barrows, of Sharpsville, in a paper before the recent meeting of the American Institute of Mining Engineers, that serious slips and explosions can be avoided and practically all Mesabi ore be used, by a proper system of charging. His conclusion is based upon two years of satisfactory practice, but it covers only the case of a furnace charged by hand, comparatively small size, and with a "batter" of stock line of .9 inch per foot. His system of charging, while perfectly feasible with hand filling, does not fit with mechanical filling appliances, which are not sufficiently flexible.

None of the modern large furnaces, with mechanical top filling apparatus, have a "batter" approaching that with which Mr. Barrows has been successful, using hand filling. The pioneer 100-foot stacks, designed eight years ago, have only about half as much slope, but have used Mesabi ores with considerable success. The furnaces which have just come under the jurisdiction of the Pennsylvania Supreme Court have a somewhat greater slope than these latter, and have been quite successful according to commercial standards. That there has been a clear tendency in the past few years to increase the slope in all new furnaces built is unquestioned. The most conspicuous recent example is the Clairton group, which have a batter of approximately .7 inch to the foot. They have been very successful although using mechanical filling, and they are equipped with the closed top, of which Mr. Barrows distinctly disapproves.

The closed top was first applied a little over two years ago and since then considerably over a dozen furnaces have been so equipped. While at the outset engineers and practical men expressed their trepidation at so daring an attempt to harness explosions, it is asserted that no serious results have so far attended their operation. It is possible that the theory of the closed top is understood only by those who have studied it most carefully. The idea certainly is not merely to hold in the entire force of the explosions which occur with the furnaces which are so liberally supplied with explosion exits. The explosion doors are held to be far from air tight in actual practice, and actually to admit air, during stoppages, while the incipiency of an explosion, which might otherwise be mild, is held to be encouraged by explosion doors to carry hot gases to a higher level than should be and thus greatly increase the violence. That these closed tops are designed to sustain a pressure of only about 35 pounds per square inch, yet do not blow off, although the explosions which frequently occur in furnaces provided with explosion doors appear to generate a force which if confined would mean a much greater pressure, is certainly some evidence that the closed top does exercise an important influence on the character of the explosion.

If the decision of the Pennsylvania Supreme Court this week should lead to a more general crusade against blast furnaces which dissipate considerable quantities of ore dust over surrounding territory, the movement would only slightly antedate one which must come, from commercial considerations, at the initiative of blast furnace owners themselves. It is necessary in any case that present practice should be improved. The ore reserves of the Mesabi range are several times greater than those of the other four

ranges combined if consideration is had of Bessemer grade only, the disparity is still greater, yet the reserves of the older ranges have been undergoing a rapid depletion which if continued would leave the Lake Superior region with nothing but Mesabi ore. Not until last season did the Mesabi ore movement even equal that of the four older ranges. Means must be found to increase greatly the proportion. As new furnaces are built their design will doubtless provide a greater slope of the stock line than has been prevalent. Top charging apparatus will be provided which will permit of more flexibility in the introduction of the material, the closed top is likely to come into greater prominence, and with the adoption of gas engines the scrubbing of furnace gas will be encouraged.

STEEL TIES AND STEEL CARS.

An increasing amount of thought is being devoted to the steel railroad tie, and it may not be more than a year or two before the manufacture of such ties will have reached commercial proportions. While it can hardly be said that the economical tie for all-around use has yet been found, it is very likely that it soon will be. After that its adoption will be gradual, but amply fast enough for the steel business, considering the enormous tonnage that will ultimately be required. The railroads which have the highest costs for ties will be the first to use the steel tie, and they will probably first use it sparingly, putting down two or three to each rail length. The character of permanent way they desire to maintain will have much to do with the matter. There is a great diversity in the price paid for ties by different roads. Those which must maintain the best roadbeds, and which are at the same time farthest from the more abundant sources of supply, pay from 75 to 85 cents apiece now for wooden ties; others whose requirements are much less exacting and who are at the same time near their supply, may pay only a third as much.

New designs of the steel tie are being constantly brought out, not so much by the inventor as by the practical designer. The Carnegie Steeel Co. has lately designed a tie which is a rolled section and weighs only 125 pounds. The Standard Steel Car Co. has just designed another form, which is pressed from a plate, and without fastenings is understood to weigh only 118 pounds. Some castings are required for the first mentioned. These two designs represent a marked advance, so far at least as weight is concerned.

As there are over 275,000 miles of regular railroad track in the United States, the enormous demand for steel ties which may spring up is apparent. A large proportion might not be in line for steel ties for many years; but supposing 100,000 miles were to be relaid with steel ties in one decade, there would be required annually 28,000,000 steel ties, if the same number of steel ties as wooden were required, which at as many as 20 to the ton would represent 1,400,000 tons of steel annually. Such figures are of course only suggestive, and do not take into account new road built.

The consumption of steel for steel cars is bound to increase. There are over a million and a half freight cars controlled by the roads reporting to Poor for 1902. The total number in the county today may exceed two million, including mine cars and other private equipment. These are mainly wooden cars which may be replaced by steel.

Testimony to the cheaper cost of maintenance of the steel car is again furnished by the operations of the "Bessemer" road, whose costs in 1902 were referred to a year ago. In 1903 the road had 2,201 wooden freight cars in service and 5,802 steel cars. The average cost of repairs to the wooden cars was $79.65 each, and of repairs to the steel cars $25.67 each. There were rebuilt 308 wooden cars and 20 steel cars, and while it may be the bare figures do not constitute an entirely fair presentation for the wooden car, they suggest that the steel car is certainly somewhat cheaper to maintain than the wooden car. Their longer life and economy as reducing dead weight, with other advantages, have been fully admitted for some time.

MANGANESE ORES IN THE UNITED STATES.

The report of the U. S. Geological Survey by John Birkinbine on production of manganese ores in the United States in 1902 has just been issued. The quantity of manganese ore produced in that year was 16,477 long tons, valued at $177,911, an increase of 4482 long tons and $61,189 over 1901, and is the largest amount mined since 1891. The production for the two years was as follows:

State.	1901			1902		
	Quantity	Value	Aver'ge value per ton	Quantity	Value	Aver'ge value per ton
	Long tons			*Long tons*		
Alabama	17	$ 111	$ 6.50			
Arkansas	91	657	7.22	82	$ 422	$ 5.15
California	610	3,610	5.92	846	10,175	12.03
Georgia	4,074	24,674	6.06	3,500	20,830	5.95
Missouri	28	280	10.00			
Montana				9,000	117,000	13.00
South Carolina				8	40	5.00
Tennessee	400	3,287	8.22			
Utah	2,500	31,250	12.50			
Virginia	4,275	52,853	12.36	3,041	29,444	9.68
Total	11,995	116,722	9.73	16,477	177,911	10.80

In the Lake Superior iron district many of the iron ores carry small percentages of manganese, but in the greater number of such ores this does not exceed 1 per cent. Some of the manganiferous iron ores mined in Colorado, and also some of the Lake Superior ores, were used in the manufacture of spiegeleisen, but the larger portion of the Colorado production was utilized as a flux by the smelters.

The production, approximate percentages of manganese, and reported total and average values of manganiferous iron ores produced in the United States in 1902 are as follows:

Locality	Quantity	Percentage of manganese	Reported total value at mines	Average value per ton
	Long tons			
Colorado	13,275	18 to 32	$ 32,371	$ 3.95
Lake Superior region	884,939	1 to 10	1,946,255	2 20
Virginia	3,000	Not given	3,000	1.00
Total	901,214	1 to 32	2,001,626	2.22

Rogers, Brown & Co. are making improvements in their Cincinnati office. They have secured additional floor space and will have a large and commodious office as soon as the changes are completed.

Concerning the newspaper report that the B. & O. R. R. Co. had decided to postpone all new work except that already under way, Chief Engineer Carothers, of that company, advises us that it is going ahead with all new work under way, but has not yet reached any conclusion in regard to letting any other contracts for improvements.

The Labor Situation.

SHEET AND TIN PLATE WAGE REDUCTION REFUSED.

(Special Telegram.)

PITTSBURG, March 30.—The reduction in wages in the sheet and tin plate trades which went into effect on March 21, to continue until April 2 and thereafter until June 30, if accepted by the sheet and tin plate workers, has been rejected by the latter by an overwhelming vote. The official count will probably be made on Saturday. Nearly all the returns are now in, however, and the result cannot possibly be changed by those yet to come. According to the circular sent to the sheet and tin plate lodges, in case of a rejection of the proposition a general strike will be called in all the mills of the American Sheet & Tin Plate Co. This clause is as follows: The reduced scale to begin on March 21 and continue until June 30, 1904, unless rejected by a vote of the members of sub-lodges. If rejected, it shall terminate on April 2, 1904, and a general strike in all the mills of the American Sheet & Tin Plate Co. must be called."

It is hard to see how a strike can be prevented, although every effort of the officials of the Amalagamted Association will be put forth to prevent any trouble. In the tin plate trade the American Sheet & Tin Plate Co. is better fortified to carry on a strike than at any previous time in its history. The stocks of tin plate are greater than have ever been accumulated in the history of the tin plate trade and is estimated at between 3,000,000 and 4,000,000 boxes. In view of these stocks the trade in general is at a loss to understand slow deliveries that are being made. In the sheet trade, on the other hand, the company's best mills are operated non-union and a strike in its union mills will not hamper operations to any great extent. It is believed that the independent manufacturers will continue to pay the scale of wages in effect prior to March 21 as the closing of the union mills of the American Sheet & Tin Plate Co. will certainly result in a shortage of both these products in the near future.

NO CHANGE IN STOVE MOLDERS' WAGES.

Press reports to the effect that the Iron Molders' Union had made a formal agreement to refrain from discrimination in any manner against the product of any of the members of the Stove Founders' National Defense Association regardless of whether it was made by union labor or not are to some extent misleading. It seems that the Stove Founders' National Defense Association has had a rule in force for years that prohibited its members from using the union label on their products. The association is working, however, in harmony with the union, having regular conferences on wages and shop conditions, and it seemed unfair to the latter to discriminate against goods made in the shops of members of an association that was on a conference footing with this branch of union labor. The Iron Molders' Union therefore agreed in substance that the union or its agents or members would not discriminate against the product of any member of the Stove Founders' National Defense Association because of his unwillingness to place a union label upon his wares.

At a meeting of representatives of these two bodies in Chicago last week the employers asked for a wage reduction of 15 percent, but after full discussion of the question it was decided that no change be made and the conference closed with a decision to continue last year's wage rate.

ADVISED NOT TO STRIKE.

A warning, accompanied by advice against strikes this spring, was sent out during the week by Grand President-Organizer John McNeil, to the members of the Brotherhood of Boilermakers and Iron Shipbuilders. He reports that information has been received of a movement of employers to disrupt organized labor wherever possible. Strikes will not be sanctioned except to resist a reduction in wages or introduction of longer working hours. Members are urged to make no demands for higher wages or better conditions at the present time but to give all the assistance possible in winning the strikes now on. In his appeal to the members President McNeil says in part:

"I desire to call the members' attention to the various strikes we have throughout the country, and to the advisability of all members being careful in making further demands. We have a strike in Birmingham, Ala., against a reduction of 50 cents a day, and several other employers have notified our members of a reduction about to take place, and in some cases where the employers intend to place our men back on the 10 hours a day. We intend to resist all reductions or introductions of long hours, and hope that the lodges who have not been confronted with a depreciation of trade, or the possibility of a reduction in any way, will be satisfied with the present conditions and make no further demands."

INDEPENDENT ORDER OF LABOR.

The Independent Order of Labor, founded in Cheyenne, Wy., a short time ago, is spreading to many industrial centers in the West, and a national body of the order will soon be formed. The founders believe enjoyment of life, liberty and property and the pursuit of happiness are inalienable rights, and that many labor unions are interfering with these rights. The new order believes that the key to the solution of the present labor question lies in educating the laboring classes as to their inalienable rights and to convince them that they are doing wrong whenever they delegate and transfer those rights to any executive committee of any union. The order is opposed to strikes, boycotts and coercion.

RESULT OF NINE-HOUR DAY.

The Des Moines Bridge & Iron Works, Des Moines, Ia., have issued an address to their employes stating that for more than two months the plant has been running at a loss, due to a lack of work and to the very low prices for such work as could be obtained. A year and a half ago the company adopted the nine-hour day with the understanding that it would return to ten hours should the new plan not prove practicable. The company now feels that it is unable to continue the nine-hour day and as the employes are not willing to work ten hours the plant has been closed. It is expected that at an early date operations will be resumed on a ten-hour basis.

COST OF STRIKES IN NEW YORK.

The report of the State Board of Mediation and Arbitration of New York shows how costly were the labor controversies of last year. The report says in part:

"One great dispute overshadows all others in the record of strikes and lockouts for 1903. The conflict between associated capital and organized labor, which brought building operations in New York City practically to a standstill for several months, was without doubt, in point of numbers concerned and losses sustained, the greatest industrial dispute in the history of the State. Outside the general building dispute in New York City, 73,871 work people were directly concerned in this year's disputes and they lost in the struggle over 2,000,000 days' work. Besides these there were at least 7,000 others who, though not participants, were thrown out of work and lost more than 200,000 days' time. If to these be added 25,834 who were directly and 11,203 who were indirectly, involved in the metropolitan disputes with a loss of over 1,700,000 days, the aggregate mounts up to over 117,000 employes concerned and 3,900,000 work days lost. These figures, even without any allowance for the incompleteness of the record, show that 1903 was marked by a greater disturbance of industrial relations in disputes than any previous year, with the possible exception of 1886. More than one-half of the 1903 disputes were in the building and metal and machinery industries, with 59 in the former and 48 in the latter."

ARGUMENTS ON THE ANTI-INJUNCTION BILL.

The hearings on the Grosvenor anti-injunction bill before the Judiciary Committee of the House closed March 23 when Samuel Gompers, president of the Federation of Labor, and other representatives of labor organizations were heard. In the hearings that have just closed the opponents of the bill have presented an array of strong arguments against it. There is much difference of opinion as to whether or not the committee will order a favorable report on the bill.

State Senator Matson, of Indiana, spoke in opposition. He

was unsparing in his criticism of labor unions, and said their policy was to intimidate, coerce and browbeat. J. C. McClosky, of Pittsburg, detailed to the committee the beneficial effects of the use of the injunction in labor troubles in Pittsburg. Without this weapon to fight lawlessness during strikes, he said, manufacturers would be entirely helpless.

Speaking of the extent to which labor is organized, Mr. Gompers said: "I agree that we do not represent a majority of the workingmen of the country, but I venture to say that we represent the most intelligent and the most skilful of the workmen of the country, and this, too, without any reflection upon the non-union men."

EIGHT-HOUR BILL OPPOSED.

In presenting his views on the pending eight-hour bill before the Senate Committee on Labor, Frederick W. Job, secretary of the Employers' Union of Chicago, said that he did not believe the labor leaders of the country represented the real views of the rank and file of workingmen, organized or unorganized. He asserted that from Mr. Gompers down these leaders persisted in misrepresenting conditions. Mr. Job called attention to labor troubles where non-union men had been beaten down with clubs or shot, and said that the official organs of organized labor never had contained one word of denunciation of these crimes. He said that the organs mentioned were edited largely by the labor leaders themselves, and therefore they assisted in making criminals of the men. As an illustration of his assertion that the leaders did not represent the men, Mr. Job said that he had been told in confidence by laboring men in Chicago that the surest manner of defeating a candidate for political office was to get him indorsed by the labor leaders, and then the rank and file, under the Australian ballot system, would turn in and vote against the candidate. Mr. Job said many instances where this had been done could be cited to prove the contention.

LABOR NOTES.

About 300 molders at Utica, N. Y., have gone on a strike on account of a 20 percent reduction in wages by the International Heater Co., the Hart & Crouse Co., the Utica Heater Co., and the Giblin Furnace Co. The molders have received three advances in wages in the past three years and the employers wished to return to the scale in effect before these advances were made.

The Bates Machine Co., Joliet, Ill., has resumed operation in its plant with about 150 men. Under protection of the injunction recently granted restraining the machinists' union from interfering with the business and employes of the company, the manufacturers intend to carry on their business without further interruption. Any violations of the injunction will be prosecuted vigorously.

The strike of iron molders employed by the National Iron Co., Duluth, Minn., which has been in progress for nearly five months, has been settled. The terms of the agreement are withheld from the public, but it is understood that concessions were made by both sides, and that the non-union molders who worked at the plant during the lockout will retain their places.

A strike from a novel cause occurred a few days ago at the plant of the International Harvester Co., South Chicago. The company endeavored to prevent the men from stopping work to get beer. The men struck, and now they are allowed the regular "beer time." They are talking of forming a union.

Orders for Steel Cars.

(Special Telegram.)

PITTSBURG, March 30.—The Pennsylvania railroad has placed an order for 2,125 steel cars. The American Car & Foundry Co. received 1,000 cars and the Standard Steel Car Co. 1,125. With the order placed by the Pittsburg & Lake Erie railroad thus makes a total of 3,125 steel cars contracted for in the last few days.

At a meeting of the Zanesville, O., bondholders of the Eastern Tube Co., of that city, the proposition made by the purchaser of the plant, Attorney E. A. Nugent, was considered and rejected. The purchaser asked that one-half of the 15 percent of subscriptions to be returned to Zanesville stockholders be turned into the new company. A modified proposition will be considered at a meeting to be held April 1.

National Metal Trades Association.

Two questions of special moment came before the sixth annual convention of the National Metal Trades Association at Philadelphia, March 23 and 24. These were the matter of agreements with employes in an individual or collective capacity, and the question, referred to both in the address of Acting President Covell and the report of Commissioner DuBrul, of the relations of national and local metal trades associations. The first of these matters had caused no little anticipatory stir among the membership of the association and a considerable number of absent members had given proxies so that they might be properly represented on the vote. Presumably the letter President O'Connell, of the machinists' union, sent to the administrative council of the association last year, looked toward the making of another agreement. The feeling on this subject among the members of the association, many of whom had very vivid recollections of the treatment the last agreement received at the hands of the union, was quite pronounced, yet there was enough difference of opinion to give promise of an interesting debate. This expectation was not realized, however, and there were indications of both surprise and relief at the ease with which the convention disposed of the matter when it finally came up.

Practically an entire session was given up to a discussion of the respective spheres and functions of local and national associations of employers in the metal trades and the matter is one upon which the developments of the coming year will be awaited with special interest.

In our issue of last week the proceedings of the convention were brought down to the close of the opening session, at which the reports of officers were presented. Particularly interesting features of Secretary Wuest's report were the statement as to the gain in membership and the statistics of the time schedules in various shops. The present membership of 322 represents a gain of 46.4 percent in the past year and of 118 percent as compared with two years ago. The statistics of hours worked in the shops of members were divided into four groups—54 and 55 hours a week constituting the first, 56 and 57 hours the second, 58 and 59 hours the third, and 60 hours the fourth. These statistics, as compared with last year's, showed that 9.7 percent more shops and 10 percent more members are working 55 hours than a year ago, the change being due largely to voluntary reductions in hours granted by employers. This tendency appears to be strongest in the large cities.

WEDNESDAY AFTERNOON.

Reports as to labor, shop and trade conditions in the various districts represented in the association were the order of business at Wednesday afternoon's session. These showed the situation to be quiet both in respect to business and labor matters. The general tenor of the statements of district chairmen was that for some time there had been more men than positions. Under this condition the well organized work of the employment bureaus, of which a number had been started in the past year in important districts, had made it possible to keep the best men fully employed.

In the report from the Tenth District, made by Antonio C. Pessano, of Detroit, reference was made to the work of the district legal committee, particularly in securing protection to the membership against the operation of the boycott.

The report of the committee on legislation was presented, detailing the participation of the National Metal Trades Association in the campaign carried on before Congressional committees at Washington in the past few months in opposition to ill-considered proposals, some of them emanating from the councils of labor union leaders. The association had been represented directly in the campaign and through officers and special committees had presented arguments against the anti-injunction bill, the eight-hour workday bill, the bill for the adoption of the metric system, and the power boat bill. Effective work had been done also in organizing protests from manufacturers all over the country.

On behalf of the committee on finance Geo. F. Steedman presented a recommendation that the present system and amount of assessments be continued. The committee also

asked that its executive functions be continued, and the convention so decided.

Daniel Davenport, of the American Anti-Boycott Association, addressed the convention on the work of organization, in the way that he has presented it before various manufacturers' associations in the past few years. He asked the National Metal Trades Association to make a declaration of its attitude toward certain legislation now proposed at Washington, particularly the unfair competition and national arbitration bills, the anti-injunction bill and the eight-hour bill. Acting on this suggestion a resolution was passed providing for the appointment of a committee of five to present resolutions bearing on the legislation in question. The chair appointed E. F. Du Brul, A. Falkenau, John Kirby Jr., Wm. Medart and Geo. V. Rogers.

The various district reports referred to above, which were the principal order of business Wednesday afternoon, were presented by the following, representing respectively the various districts from District 1 to District 17, excepting District 14: E. P. Robinson, East Boston; Chas. E. Hildreth, Worcester, Mass.; F. A. Scheffler, Harrison, N. J.; W. Grant King, Buffalo; A. Falkenau, Philadelphia; Thos. E. Durban, Erie, Pa.; Wm. Lodge, Cincinnati; J. Kirby Jr., Dayton, O.; W. D. Sayle, Cleveland; A. C. Pessano, Detroit; W. A. Evans, Indianapolis; F. K. Copeland, Chicago; E. C. Wells, Quincy, Ill.; O. B. Kinnard, Minneapolis; E. Burkitt, Jackson, Tenn.; G. W. Watts, Toronto, Ont.

Wednesday evening was given up to a smoker, held in convention hall. It was under the auspices of the Philadelphia entertainment committee, who were unanimously voted to have shown themselves accomplished hosts.

THURSDAY MORNING.

The question of agreements with employes as to wages and shop conditions came up promptly on the opening of Thursday morning's session. As usual, when the matter of agreements with employes comes up, the amount and kind of recognition to be accorded the unions was immediately thought of by many, and such were prepared to measure arguments with any in the convention who might favor such relations with unions as are maintained by some employers and employers' associations. The committee on agreements, reporting through Antonio C. Pessano, soon set at rest any apprehension of a heated discussion by presenting the following:

"WHEREAS, this association in convention assembled in Buffalo, N. Y., in April, 1903, adopted the following resolution, viz.:

"*Resolved*, that whenever the members of this association, either individually or as members of a local association, acting in harmony with this association, shall find it to their advantage to enter into an agreement with their employes, either individually or collectively, such action shall have the approval of this association, provided such agreement shall secure and preserve equitable conditions in the workshops of our members and shall not in any detail conflict with the declaration of principles adopted by this body and shall meet with the approval of the administrative council.

"Therefore, be it

"*Resolved*, that this convention hereby reiterates and confirms said resolution."

An agreement in harmony with the association's declaration of principles, and one acceptable to the administrative council, could not, it was agreed on all hands, involve anything detrimental to the interests of the manufacturer or the employe, for that matter, and the reading of the above resolutions was followed by their unanimous adoption without discussion. The applause that ensued upon this action indicated the satisfaction of all present that the question had been disposed of without precipitating a flood of discussion.

Local and National Associations.

The second order of the morning, the relation of local and national associations in the metal trades, called out a very general interchange of opinions. The situation, as presented in the presidential address of Mr. Covell and the report of Commissioner Du Brul, is the result of a tendency on the part of many members of local associations to depend upon such associations alone. Members of local associations who also belong to the N. M. T. A. are under heavier expense than the others, and in many cases when the N. M. T. A. fights the battles of its members in a given locality it also benefits other manufacturers in that locality who do not contribute to the work.

The question came up in the form of a resolution from the ways and means committee, which declared that "the present form of organization of the N. M. T. A. presents the best solution of the problem of the relation of the N. M. T. A. to local conditions and to local associations and should be maintained in its present form, and the influence of the N. M. T. A. immediately extended on these lines." This was presented merely as a basis of discussion and not with the expectation that it would be adopted by the convention. The question was conceded by all who took part in the debate to be one requiring deliberate handling and no little investigation, and was therefore one that could not be disposed of on the floor of the convention.

Chairman Antonio C. Pessano, of the ways and means committee, in presenting the resolution gave the history of the employers' organization which had done such successful work in the 10th district. The Detroit association, with 76 members, of whom 20 are in the N. M. T. A., had fought with success a series of local strikes for the unionizing of shops.

Geo. F. Steedman argued that divergent local organizations, with a membership embracing different trades, some of them belonging to one national organization and some to another, cannot be brought into a uniform national organization. The strength of the locals is in having the different lines largely represented, but in most cases only a portion of the local membership would be eligible to membership in the N. M. T. A., for example.

W. D. Sayle, of Cleveland, O. B. Kinnard, of Minneapolis, and Jno. D. Hibbard, of Chicago, discussed the question from the standpoint of local associations in their respective cities. In the case of the Chicago association it appeared that there was a great variety of trades represented—the employes dealt with including, besides machinists, molders, coremakers, brass workers, boiler makers and structural workers. There are 125 or 130 members of the Chicago association. The N. M. T. A. has 31 members in Chicago, of whom 20 are in the local.

C. E. Hildreth presented a paper prepared by a Worcester, Mass., member of the association, advocating a division of functions as between the locals and the national association similar to that provided by the constitution of the United Sates for the States and the general government. H. M. Leland emphasized particularly as the function of the national association the concentration of sentiment against unwise measures proposed at Washington, and the carrying on of much needed general educational work. The representations of labor leaders at Washington relative to the anti-injunction bill and the eight-hour bill were given great weight by Senators and Representatives, and were taken to stand for public sentiment on these questions until the manufacturers woke up and began raining telegrams upon the national legislators and sending delegations to combat the arguments of the labor leaders that had been so potent at first because practically unopposed.

E. P. Robinson, of East Boston, argued that the national association cannot be a federation of locals, because the latter represent so many divergent interests and lines of manufacture.

The discussion was continued by Thos. E. Durban, of Erie, Pa.; J. H. Schwacke, of Philadelphia; N. B. Payne, of Elmira, N. Y.; F. H. Stillman, of New York; M. H. Barker, of Boston; Thos. Shipley, of York, Pa.; Walter L. Pierce, of Brooklyn; A. Falkenau, of Philadelphia; and J. C. Hobart, of Cincinnati. There was an agreement by a number of the speakers that the handling of strikes was a matter largely for local associations, as was the enforcement of the law and opposition to the boycott. Broader questions and those of national import, with the educational and legislative work that called for capable and persistent effort, were looked upon as giving to the national body ample scope. It was agreed that both national and local associations were necessary. The former, with their large resources and their wide influence, could be most effective in acting as a deterrent and restraining influence.

A number of secretaries of local associations were present and were invited to give their views: H. C. Hunter, of the New York Metal Trades Association; Paul Blatchford, of the

Chicago Metal Trades Association; Herman S. Hastings, of the Worcester (Mass.) Metal Trades Association, and Thos. M. Roche, of the Cleveland Manufacturers' Association. It was suggested in connection with their remarks that some adjustment of expense might be made, which would save firms belonging to both national and local associations from bearing the full double burden of such memberships.

The result of the morning's discussion was the reference of the resolution on local and national associations to a committee to be selected by the chairman from the administrative council, this committee to go deliberately into the question of plan and scope of organization, and, after investigating the subject thoroughly, to present a report to the administrative council.

THURSDAY AFTERNOON.

The concluding session of the convention opened on a program that taxed the expediting powers of the chairman and the convention committee.

A matter of considerable importance presented by the committee on constitutional amendments was a substitute for Article 9 of the by-laws which relates to labor difficulties and methods for the relief of members involved in such difficulties. The proposed amendment was designed to correct a misunderstanding which seemed to have arisen as to the extent to which the association should extend financial aid in compensation for the loss of production due to strikes. Some members had larger expectations as to the aid to be expected than the administrative council felt could be met in justice to the interests of all. The amendment changed the reading of the by-laws in respect to the methods to be adopted for the relief and protection of a member in case of strike, leaving these to the discretion of the administrative council. The amendment as reported was adopted, subject to the proviso that it becomes effective if in the opinion of legal counsel it does not in any way conflict with other sections of the constitution and by-laws.

The question of membership in the Citizens' Industrial Association, an organization composed of various employers' associations and Citizens' Alliance branches, and having D. M. Parry, of Indianapolis, for its president, was brought up by Antonio C. Pessano, of the ways and means committee. He moved that the National Metal Trades Association join the Citizens' Industrial Association provided nothing in its constitution and by-laws or policy was found to be in conflict with the constitution and by-laws of the N. M. T. A. There was some discussion of the motion and the matter was finally referred to the administrative council with power to act.

The conduct of the strike and lockout at Quincy, Ill., growing out of the case of Thomas Trinker, an employe in the shops of the Quincy Engine Works, was brought up by Commissioner Du Brul. The beginning of the trouble was the arrest of Trinker in March, 1903, on the charge of murder preferred by his wife. He was taken to Chicago, but the charge was not pressed against him. On his return in 10 days the shop committee notified the company that he would go to work on a certain day, but they were told that his place had been filled. Trinker being president of the union, discrimination was charged and a strike followed. Then came a lock-out in other shops because of the union's refusal of arbitration, and the fight has been on ever since, the shops being now run absolutely non-union, with such results in the way of larger output per man that the Quincy employers have no desire to return to the old conditions.

A motion was made, endorsing the action of the association's officers in the Quincy strike and lockout and pledging continued support to the Quincy members. After Commissioner Du Brul had given a resume of the case, detailing the violence resorted to by the strikers, the motion was carried unanimously.

New Officers.

The report of the nominating committee was presented by the chairman, O. B. Kinnard, of Minneapolis, and the nominations were seconded by Antonio C. Pessano in a bright, appreciative speech. The secretary was unanimously instructed to cast the ballot for the entire list, which is as follows:

President—H. N. Covell, Lidgerwood Mfg. Co., Brooklyn.

First Vice President—J. W. Gardner, Gardner Governor Co., Quincy, Ill.

Second Vice President—W. D. Sayle, Cleveland Punch & Shear Works Co., Cleveland.

Treasurer—F. A. Geier, Cincinnati Milling Machine Co., Cincinnati.

Councillors for Two Years—G. F. Steedman, Curtis & Co. Mfg. Co., St. Louis; F. K. Copeland, Sullivan Machinery Co., Chicago; P. B. Kendig, Seneca Falls Mfg. Co., Seneca Falls, N. Y.; M. H. Barker, American Tool & Machine Co., Boston.

On taking the chair as president, Mr. Covell acknowledged the honor done him and pledged the association his best efforts. He was heartily applauded, his dispatch of business, promptness and fairness having won general approval.

A resolution of thanks was passed in recognition of the faithful and thoroughgoing work in the past year of the association's elective officers and its commissioner and secretary. Hearty recognition was made also in a series of resolutions of the alert and hospitable attentions of the Philadelphia committee from beginning to end of the convention.

E. Burkitt, of Jackson, Tenn., as chairman of the auditing committee, reported that the accounts of the treasurer had been found correct and accompanied the report with the examining accountant's sworn statement.

Commissioner Du Brul, as chairman of the convention's committee on pending measures at Washington, presented resolutions, which were adopted, recommending:

1. That the administrative council be given authority to present the objections of the association to the unfair competition and national arbitration bills, in case these are found to be inimical to the interests of the membership.

2. That the administrative council be authorized to present the association's objections to the anti-injunction bill and to answer the argument of Congressman Grosvenor in favor of that measure.

3. Declaring the 8-hour bill now before the Senate committee on education and labor to be an arbitrary, illogical and dangerous measure, against which the association protests, and this protest is ordered sent to Senator McComas, chairman of the committee having the bill in charge.

Scientific Shop Management.

The last hour of the convention's sessions was given up to a paper by H. L. Gantt, of Philadelphia, on "Exact Time Study as the Basis of Pay for Work Done," and an address by F. W. Taylor, of Philadelphia. Both gentlemen have become well known for their research in the direction of a better method of compensating labor in the shop—one that will secure the maximum return both to the workman and the proprietor, and that presumably will do away with much of the friction attending the methods long in use. In introducing his paper, which is printed in full elsewhere in this issue, Mr. Gantt said:

"When I promised Mr. Du Brul to address you I did not quite understand the objects of your association, and have listened today with a great deal of interest to your discussion. While I entirely agree with you that there are cases in which there is nothing to do but fight, and in such cases the fight must be to a finish, I have not heard a single man say one word about the way to prevent fights. Your whole object seems to be to oppose brute force with brute force, and to have most brute force on your side. I agree with you that after the fight has begun, this is the only thing to do; but cannot something be done before that time arrives, to maintain harmony? I am convinced you are not giving this portion of the subject enough attention and it is on this portion that my remarks will be made.

"Progress today is not made by brute force, but by knowledge, and the most exact knowledge is none too good. My remarks, then, are to advocate a scientific study of all the questions that may cause trouble, a long time before the trouble begins to show itself. If you do this you will be able to oppose brute force with knowledge, and the result cannot be doubtful."

Mr. Taylor followed with an address on "A Differential Pierce Rate System," much in the line of papers on this subject he has presented before the American Society of Mechanical Engineers.

It was regretted that the lateness of the hour and the scat-

tering of members for evening trains prevented full discussion of these important addresses. The expectation is that the subject will have attention at the association's next convention.

At a meeting of the administrative council following the convention's adjournment, Commissioner Du Brul and Secretary Wuest were reappointed and action was taken on a number of matters which had been referred to the council.

Those in Attendance.

H. N. Covell, Lidgerwood Mfg. Co., Brooklyn, N. Y.
J. W. Gardner, Gardner Governor Co., Quincy, Ill.
G. A. Mayer, Cincinnati Milling Machine Co., Cincinnati.
E. F. DuBrul, Commissioner N. M. T. A., Cincinnati.
Robert Wuest, Secretary N. M. T. A., Cincinnati.
G. F. Steedman, Curtis & Co., St. Louis.
P. F. Kendig, Seneca Falls Mfg. Co., Seneca Falls, N. Y.
W. P. Eagan, F. W. Wolf Co., Chicago.
H. M. Barker, American Tool & Machine Co., Boston.
C. Birmingham, Canadian Locomotive Co., Kingston, Ont.
G. B. Kinnard, Kinnard-Haines Co., Minneapolis, Minn.
Carl Horix, Geo. B. Sennett Co., Youngstown, O.
A. Falkenau, Falkenau-Sinclair Co., Philadelphia.
M. D. Sayle, Cleveland Punch & Shear Works Co., Cleveland.
A. C. Pessano, Great Lakes Engineering Co., Detroit.
James O. Parker, Heiland Machine Works, Evansville, Ind.
A. H. Bullard, Bullard Machine Tool Co., Bridgeport, Conn.
W. J. Wooley, Wooley Foundry & Machine Works, Anderson, Ind.
Henry M. Leland, Leland & Faulconer Mfg. Co., Detroit.
John L. Mohun, De Laval Steam Turbine Co., New York.
F. C. Caldwell, H. W. Caldwell & Son Co., Chicago.
T. A. Jones, W. A. Jones Foundry & Machine Co., Chicago.
F. A. Strong, Eaton, Cole & Burnham Co., Bridgeport, Conn.
W. A. Evans, Pioneer Brass Works, Indianapolis, Ind.
F. W. Schultz, *Iron Age*, New York.
Geo. M. Jackman, Springfield Mfg. Co., Bridgeport, Conn.
Chas. L. Newcomb, Deane Steam Pump Co., Holyoke, Mass.
J. W. Wylie Jr., Goddard Machine Co., Holyoke, Mass.
N. B. Payne, Payne Co., Elmira, N. Y.
R. M. Downie, Keystone Driller Co., Beaver Falls, Pa.
Jno. A. B. Patterson, Standard Gauge Steel Co., Beaver Falls, Pa.
J. S. Detrick, Detrick & Harvey Machine Co., Baltimore, Md.
M. L. Kerlin, Kissinger & Son, Cincinnati.
Chas. E. Hildreth, P. Blaisdell & Co., Worcester, Mass.
Geo. M. Cooper, Manufacturers' Assn. of Pittsburg, Pittsburg.
F. K. Copeland, Sullivan Machine Co., Chicago.
S. P. Egan, J. A. Fay & Egan Co., Cincinnati.
Herman S. Hastings, Worcester Metal Trades Assn., Worcester, Mass.
E. W. Hargrave, Cincinnati Tool Co., Cincinnati.
Fred. H. Beach, Knowlton & Beach, Rochester, N. Y.
Thos. M. Roche, Manufacturers' Assn. of Cleveland, Cleveland.
H. W. Hawley, Pacific Iron Works, Bridgeport, Conn.
Walt. Gordon Merritt, American Anti-Boycott Assn., Danbury, Conn.
E. Burkitt, Southern Engine & Boiler Works, Jackson, Tenn.
B. F. Lyon, Eaton, Cole & Burnham Co., Bridgeport, Conn.
F. M. Etting, Whiting Foundry Equipment Co., Harvey, Ill.
Jos. Reid, Jos. Reid Engine Co., Oil City, Pa.
John Kirby Jr., Dayton Mfg. Co., Dayton, O.
Wm. Graver, Wm. Graver Tank Works, Chicago.
G. D. Kirkham, Harris Automatic Press Co., Niles, O.
F. Chudoba, Miller, DuBrul & Peters Mfg. Co., New York.
Alonzo W. Whitcomb, Whitcomb Mfg. Co., Worcester, Mass.
F. H. Stillman, Watson-Stillman Co., New York.
James C. Hobart, Triumph Electric Co., Cincinnati.
David M. Ireland, Ireland & Matthews Mfg. Co., Detroit.
Geo. F. Brooks, Harrington & Richardson Arms Co., Worcester, Mass.
Wm. Lodge, Lodge & Shipley Machine Tool Co., Cincinnati.
D. B. Kirk, C. & G. Cooper Co., Mt. Vernon, O.
Robt. Biddle, Jno. L. Gaumer Co., Philadelphia.
P. G. March, Cincinnati Shaper Co., Cincinnati.
Thos. E. Durban, Erie City Iron Works, Erie, Pa.
Napoleon DuBrul, Miller, DuBrul & Peters Mfg. Co., Cincinnati.
C. H. Pond, Scranton Forging Co., Scranton, Pa.
F. T. Ducharme, Ireland & Matthews Mfg. Co., Detroit.
Justus H. Schwake, Wm. Sellers & Co., Inc., Philadelphia.
Peter Weber, Edison Phonograph Works, Orange, N. J.
Arthur E. Corbin, Connecticut Valley Machinery Trades Association, Springfield, Mass.
A. I. Findley, *The Iron Trade Review*, Cleveland.
G. Bartol, Otis Steel Co., Ltd., Cleveland.
D. C. Warren, *The Iron Trade Review*, New York.
Will L. Finch, Littleford Bros., Cincinnati.
Benj. Sebastian, Sebastian Lathe Co., Cincinnati.
H. M. Kelley, Lloyd Booth Co., Youngstown, O.
L. A. Woodward, William Tod Co., Youngstown, O.
Wm. C. Williamson, Williamson Bros. Co., Philadelphia.
D. H. McPherson, Metal Manufacturers' Association, Philadelphia.
H. B. Durdorff, Jeffrey Mfg. Co., Columbus, O.
Walter L. Pierce, Lidgerwood Mfg. Co., Brooklyn, N. Y.
Edgar Penney, Newburgh Ice Machine & Engine Co., Newburgh, N. Y.
Thos. Shipley, York Mfg. Co., York, Pa.
E. M. Woodward, Woodward & Powell Planer Co., Worcester, Mass.
Henry W. Standart, Northern Engineering Works, Detroit.
Jno. D. Hibbard, John Davis Co., Chicago.
F. M. Cresson, Geo. V. Cresson Co., Philadelphia.
E. P. Wilson, Cincinnati League, Cincinnati.
Paul Blatchford, Chicago Metal Trades Association, Chicago.
R. J. Younge, Canadian Manufacturers' Association, Toronto, Ont.
Thos. Watson, Thos. Watson Co., New York.
Julius Y. Day, Whitelock Printing Press Mfg. Co., Derby, Conn.
F. D. Wanning, Birmingham Iron Foundry, Derby, Conn.
Geo. L. Markland, Philadelphia Gear Works, Philadelphia.
Geo. W. Watts, Canadian General Electric Co., Toronto, Ont.
E. E. Greenwald, The I. & E. Greenwald Co., Cincinnati.
Daniel Davenport, American Anti-Boycott Assn., Bridgeport, Conn.
H. Y. Lechtenberg, Central Iron Works, Quincy, Ill.
Wm. Medart, Medart Patent Pulley Co., St. Louis.
Jas. L. Murrill, Murrill & Keizer Co., Baltimore.
Albert W. Adt, John D. Adt, Baltimore.
W. B. Morrison, McIntosh, Seymour & Co., Auburn, N. Y.
James Eastwood, Benj. Eastwood Co., Paterson, N. J.
W. P. Thompson, Thompson Brothers, Philadelphia.
Chas. A. Haney, Sloan & Chase Mfg. Co., Ltd., Newark, N. J.
Robt. J. Hearne, Durbrow & Hearne Mfg. Co., New York.
O. P. Briggs, Commissioner National Founders' Association, Detroit.
H. H. Latham, H. H. Latham Machinery Co., Chicago.
Fred'k Scheffler, Marine Engine & Machine Co., Harrison, N. J.
M. E. Kennedy, Kennedy Valve Mfg. Co., Coxsackie, N. Y.
E. P. Robinson, Atlantic Works, East Boston, Mass.
Duncan S. Russell, James Russell Boiler Works Co., Boston.
Fred F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.
Geo. V. Rogers, Holmes & Blanchard Co., Boston.
F. A. Fisher, Cape Ann Anchor Works, Gloucester, Mass.
R. C. Payson, Portland Co., Portland, Me.
J. J. Satterthwait, Remington Machine Co., Wilmington, Del.
Chas. H. Phillips, Chas. H. Phillips, Boston.
M. B. McLaughlin, Geo. T. McLaughlin Co., Boston.
Frank E. Hoadley, Farrel Foundry & Machine Co., Ansonia, Conn.
E. G. Bernard, E. E. Bernard Co., Troy, N. Y.
Henry H. Lynch, Hodge Boiler Works, Boston.
James McNaughton, American Locomotive Co., Schenectady, N. Y.
Frank A. Wilson, Boston Labor Bureau, Boston.
E. A. Corbin, Corbin & Goodrich, Philadelphia.
Geo. T. Brown, Brown Cotton Gin Co., New London, Conn.
John N. Derby, Manning, Maxwell & Moore, New York.
A. E. McClintock, Secretary National Founders' Association, Detroit.
W. A. Stevenson, Norwood Engineering Co., Florence, Mass.
Wm. Harknes, Builders' Exchange, Philadelphia.
W. W. Wood, National Elevator & Machine Co., Honesdale, Pa.
Samuel Moyer, Lunkenheimer Co., Cincinnati.
Julius Boekel, Wm. Boekel & Co., Philadelphia.
Jos. Torrey, Torrey Boiler Bushing Works, Bath, Me.
Cyrus Borgner, Cyrus Borgner Co., Philadelphia.
Wm. E. Hallowell, Harrison Safety Boiler Works, Philadelphia.
E. H. Mumford, Tabor Mfg. Co., Philadelphia.
Henry F. Arnold, American Tool & Machine Co., Boston.
Edw. E. Bartlett, Edw. E. Bartlett, Boston.
Henry R. Luther, Barbour-Stockwell Co., Cambridgeport, Mass.
Thad. L. Harnham, Whiting Foundry Equipment Co., Harvey, Ill.
Henry C. Hunter, New York Metal Trades Association, New York.
Wm. C. Warren, S. L. Allen & Co., Philadelphia.
H. L. Gantt, "Shop Method," Philadelphia.
John A. Penton, Detroit.
Thos. Murphy, Murphy Iron Works Co., Detroit.
M. K. Bowman, James Reily Repair & Supply Co., New York.

Long Campaign of a Lehigh Valley Furnace.

The Carbon Iron & Steel Co., Ltd., of Parryville, Pa., passed, on March 27, the fifth anniversary of the present run of its No. 3 furnace, having made in the five-year period 168,592 gross tons of pig iron, with the furnace still in operation. This long and successful run is particularly noteworthy, since the company has been obliged since March, 1899, to shut down temporarily six times on account of high water, and has passed through a six months' coal strike and a serious smallpox epidemic. The furnace was changed from foundry iron to low-phosphorus iron and back again three times, and made of the above tonnage, something over 30,000 tons of standard low-phosphorus Bessemer iron. The dimensions of the furnace are 65 x 15 x 9½ feet. This is probably the longest and most successful run of any furnace in the Lehigh Valley. The officers of the company are: M. S. Kemmerer, chairman; H. A. Butler, secretary and treasurer; and S. S. Freeman, superintendent. The works are at Parryville, Pa., and the general offices at Mauch Chunk, Pa.

The Princess Estates Co., Ltd., Niagara Falls, Ont., has been incorporated with a capital of $5,000,000 for the purpose of developing factory and industrial town sites near the great electric power plants now being constructed on the Canadian side of the river at Niagara Falls. The company has acquired about 2,500 acres, having a frontage of area 25,000 feet on Niagara and Welland rivers, very desirable for the locating of industries using electric power.

Emission of Blast Furnace Flue Dust Enjoined.

The Supreme Court of Pennsylvania handed down a decree this week perpetually enjoining the Jones & Laughlin Steel Co., of Pittsburg, from operating its Eliza furnaces in such manner as to cause ore dust to fall on the property of Mr. and Mrs. E. R. Sullivan, who brought the suit. The decision is of the utmost importance not only to the Jones & Laughlin Steel Co., directly affected by it, but to other blast furnace operators whose furnaces are located in or near a residence district.

Suit was commenced by the Sullivans against the Jones & Laughlin Steel Co. in 1902, it being charged that by the frequent emissions of ore dust from the Eliza furnaces their property was greatly depreciated in value, and trees and shrubbery killed. In a long and tedious trial, it was testified that owing to the necessity of using a large percentage of Mesabi ore, slips were frequent and that no method had yet been devised for preventing the emission of this ore dust from the furnace stacks at the time of slips and explosions. Witnesses for the defendants testified that they were experimenting with a process by which their ores were to be briquetted before being charged into the furnace and also with a new furnace top. About a year ago the lower court handed down a decision dismissing the bill, but the case was carried to the Supreme Court where the decision was reversed, although the judges stood four to three on the decision.

Briquetting Experiments.

Whether these slips can be prevented where a large percentage of Mesabi ore is used is a question that is perplexing not only the Jones & Laughlin Steel Co., who would like to have them prevented for reasons of economy, but iron and steel engineers as well. Closed furnace tops now on the market are intended to prevent explosions of this kind entirely, though some engineers take the position that these emissions at the time of slips cannot be wholly prevented. The method of briquetting fine ores is by no means a success, as the experimental plant erected at the Eliza furnaces has shown. While the briquettes can be made very hard they will not stand up in the furnace until the zone of fusion is reached and unless the briquette will do this the process is of no value. On the other hand a number of engineers take the stand that the design of the furnaces is probably at fault and point to the construction of the Clairton furnaces, erected for the use of fine ores almost entirely. These stacks have been operated with success, and it is asserted that furnaces built on these lines will obviate many of the slips and explosions resulting from the use of Mesabi ores, in addition to increasing the output. The majority opinion is in part as follows:

Statements of Facts.

"In 1859 the appellee's predecessors in title purchased land from Jennie P. A. Sullivan, one of the appellants, and erected furnaces on it. It lies between the Monongahela river and Second avenue. This avenue runs along the foot of the bluff, on the top of which the properties of the appellants are situated, at an average distance of about 1,000 feet in a northerly direction from the furnaces of the appellee. The tops of these furnaces are a little lower and the stacks a little higher than the bluff. The district in which the furnaces are located is, and for many years has been, distinctively and exclusively a manufacturing one, and the district on the top of the bluff where the appellants' property is situated, is, and has been for some time, a residence locality, which has been subject to the smoke and dust from the furnaces and mills along the Monongahela river at the foot of the bluff, but was never subject to ore dust, in annoying and injurious quantities, until about July 1, 1901. Prior to 1898 the appellee had three furnaces in blast on the site of the present one, and about seven or eight years before this bill was filed began the use of Mesabi ore. It had been using Old Range ore, the supply of which is being exhausted. The amount of Mesabi ore used during the time stated averaged about 30 percent of the quantity used. This Mesabi ore, brought from Minnesota, is of a fine and dust-like quality. Old Range is coarse and lumpy. No complaint is made of the emission and settling of dust upon the properties of appellants when either or both of these ores was used prior to 1901.

"Between March 1, 1898, and May, 1901, according to the court's ninth finding, the three furnaces at that time constituting the Eliza furnaces were rebuilt, improved and enlarged upon the site then and now occupied by them and a fourth furnace added upon that site. These furnaces as rebuilt, improved and enlarged are constructed in accordance with modern and approved plans and in their construction are in every respect equipped with modern appliances and improvements; are equal, in many respects superior, to other furnaces in this locality in which pig iron is manufactured, and are among the largest known in the iron business, having a capacity each of about 500 tons daily production and consuming together about 4,000 tons of ore daily. The capacity of these new furnaces is twice or three times that of the old one replaced by them. After the fourth and last furnace was blown in the annoyance and injury began, against the continuance of which relief is sought by this bill.

"The escape of dust from blast furnaces into the air, is, and always has been, incident to their operation. It escapes at all times, but in larger quantities when what is known as a slip occurs in the furnace. In the operation of all blast furnaces slips occur from time to time. These are occasioned by the caking or encrusting of the ore in the stack of the furnace, and the falling away of the ore, fuel and limestone beneath the crust by reason of the continued combustion and liquefaction of the ore, thus forming a chamber or vacant space into which the encrusted ore at the top drops, occasioning an explosion, the violence of which depends upon the extent of the cavity produced and the amount of gas accumulated therein. Slips occur at irregular intervals, and perhaps more frequent since the use of Mesabi ore, their frequency depending upon the manner in which the furnace is working. Sometimes there may be but four slips in 24 hours, while at other times during the same period the number may be as high as eighteen.

"The seventh finding is: 'Ore dust was first noticed settling upon the properties in the neighborhood of defendant's furnaces as early as 1899, but the deposit did not become serious until about July, 1901. The effect of the dust is not only annoying, but injurious to property; it chokes rain conductors upon the houses, discolors fabrics and paints, and injures carpets and curtains; it is of a greasy nature and difficult to remove from both garments and paints; it has also been destructive to fruit and shade trees and vegetation generally, and has depreciated value of plaintiffs' property from 25 to 50 percent.' The furnaces were operated in a careful and skillful manner and no effort or money was spared to keep them in constant good order or repair. As to the escape of this ore dust, a further finding is the sixteenth: 'The escape of ore dust, due to slips in the furnace, is a financial loss to the operator, both in the material of production and in loss of ore; the defendant has been diligent in its efforts to find means, or to adopt appliances or inventions which will prevent the escape of dust from its furnaces; up to the present time no appliance has been found which will effectually prevent or reasonably diminish the escape of the ore dust from blast furnaces when slips occur. The use of Old Range ores exclusively would not materially lessen the number of slips occurring in the furnaces, but would to a considerable extent decrease the amount of ore dust discharged in the air at each explosion.'

New Methods Objectionable.

"The appellants are not complaining because appellee is operating its furnaces. Their complaint is that the appellee, in tearing down the three furnaces and replacing them with the four new ones, of immense size and several times the capacity of the old, and in using in them the fine Mesabi ore dust, without so operating them as to prevent the escape of the dust from slips, causing admitted devastation, is practically confiscating their properties. To preserve these to them, and to protect them in their absolute rights to the enjoyment of their private property, subject to the general conditions of the city in which they live, this bill is filed; and its prayer is not to restrain the appellee from operating its furnaces and manufacturing iron, but is to enjoin it from such operation of them as causes the serious and exceptional injuries alleged in the bill and proved by the testimony.

"While the right of the appellee to locate and operate its

furnaces in a manufacturing district of the city of Pittsburg must be conceded, there is a right in the appellants entitled to no less recognition and protection by the law and that is the one they have exercised, of erecting houses on their lands in a residential portion of the same city.

"If this bill were for relief from personal inconvenience and interference with the appellants' full and free enjoyment of their property, due merely to the conditions of smoke and dust that have existed for years and will exist as long as the city itself continues to be the great steel and iron manufacturing center, it would be promptly dismissed. Of the smoke and dust now coming from all the other surrounding mills and furnaces no complaint is made, and of what used to come from the old furnaces of the appellee the appellants made no complaint, and would not be complaining now but for the changed conditions brought about by the appellee. The court below, though requested by it, refused to find that 'The matters complained of by plaintiffs are only such discomforts and inconveniences as are and always have been incident to and consequent upon close proximity to an exclusively manufacturing section of a manufacturing city.'

"The court below found that 'the use of Mesabi ore in the manufacture of pig iron seems at present to be a necessity.' At the same time it refused to find, as requested by defendant, that 'it is today a practical and commercial impossibility for manufacturers of iron and steel to obtain a supply of ores for their blast furnaces other than by the use of Mesabi ores.' There is a finding: 'That appliances have been suggested for the purpose of diminishing or preventing dissemination of ore dust from furnaces. These appliances, however, have not been generally adopted by operators. The defendant company, however, has recently entered into a contract with the patentee of one of these appliances, known as the closed top, for the placing upon at least one of their furnaces of that design. It has also entered into a contract for the construction at its furnaces of a plant for the briquetting of Mesabi ore, with the end in view of preventing slips and thereby avoiding the escaping dust into the atmosphere. The success of these devices is not assured, they being to a great extent matter of experiment.' It is therefore by no means certain that the appellee will not be able to obviate as is his duty the continuance of the great injury done to the appellant either by substituting another ore for the Mesabi ore or by adopting appliances that will prevent escape of dust from slips.

"The right of a man to use and enjoy his property is as supreme as his neighbor's, and no artificial use of it by either can be permitted to destroy that of the other. To this rule, if at times there are apparently some exceptions, the present case is not one of them.

"The decree of the court below is reversed, the bill is reinstated and the record remitted, with directions that an injunction be issued perpetually enjoining Jones & Laughlin Steel Co., the appellee, from such operation of its furnaces, situated in the Fourteenth ward, city of Pittsburg, and described in the bill, as to cause to be emitted therefrom clouds of ore dust, working and causing the injury to the property of the appellants as in the bill described and found by the court below, the costs on this appeal and in the proceedings below to be paid by the appellee."

Dissenting Opinion.

Justice Thompson in dissenting said in part: "The blast furnaces of the appellee company represent a cash investment of $5,000,000, and in them and incidental thereto are employed 10,800 persons, who are paid in wages monthly $500,000. Thus upon the one side is a business started many years ago which has been steadily developing until it has reached a very great magnitude. With its increase its appliances have been improved and its blast furnaces enlarged, and these have been the natural growth of its business. It has managed its business with a due regard as far as practicable for those who lived near the district within which its blast furnaces were located. It has been diligent in the effort to obtain appliances and inventions designed to avoid as much as possible any annoyance that might arise from smoke dust or gases. * * * The facts show the inability of the appellee to use such ores would practically operate as a prohibition of its business, and thus upon one side a decree restraining appellee from such use would so impair its capacity to do business that it would produce disaster affecting a large manufacturing interest involving the welfare of an army of employes and be productive of irreparable injury. Upon the other side the damage that would arise from the continuance of that business by a refusal to make a decree would be that the rain conductors upon appellants' houses might still be choked somewhat and their fabrics and paints discolored and their carpets and curtains injured. That they still might have some difficulty in removing the grease stains from their garments and paints, and their shade trees and fruit trees, if such be of value amid the smoke of Pittsburg, might be destroyed and their property might be depreciated from 25 to 50 percent of its value. Such latter damage, however, being directly to the property itself, is clearly ascertainable and cannot well be classed as irreparable.

"Pittsburg is a monument to the progress and activity of the manufacturing interests, and her achievements in that direction have made her one of our most conspicuous cities. Judicial restriction that would limit these activities might well be regarded as inimical to her best interests in the direction of progress and where judicial action is based upon 'matter of grace' guided by wise discretion, it should not be necessarily narrowed, but should be, to an extent as far as may be practicable and legal, broadened in a way most wise for the best form of progress and the highest standard of development. I am of opinion that the decree of the court below dismissing the bill should be affirmed."

The Ball Engine Co., Erie, Pa., has made the following recent shipments: National Tube Works, Pittsburg, Pa., one 800-h. p. cross compound Corliss engine, direct connected to alternator; United States Coal Co., Dillonvale, O., one 500-h. p. Corliss direct connected engine; Whiting Foundry Equipment Co., Harvey, Ill., one 400-h. p. Corliss direct connected engine; Continental Coal Co., Jacksonville, O., one 400-h. p. engine; Steamer City of Buffalo, Detroit, Mich., one 80-h. p. direct connected engine; J. M. Denholm Bros. & Co., Ltd., East Liberty, Pa., one 150-h. p. direct connected engine; Leyden Coal Co., Leyden, Colo., one 175-h. p. engine; Forest Park Highlands Amusement Co., St. Louis, Mo., two 175-h. p. direct connected engines; Semet-Slovay Co., Syracuse, N. Y., two 150-h. p. direct connected engines; Dilworth, Porter & Co., Ltd., Pittsburg, Pa., three 50-h. p. engines; Union Ice Co., Bakersfield, Cal., one 350-h. p. engine; Soldiers & Sailors' Home, Grand Island, Neb., one 75-h. p. direct connected engine.

Inquiry concerning the prospects of the Waukesha Sheet Steel Co., Waukesha, Wis., which was recently ordered by the Wisconsin Central railroad to vacate the plant which it has been occupying, develops that the affairs of the company are so complicated at the present time that it is utterly impossible for any one to foresee what the outcome will be, though it is the opinion of people at Waukesha interested in the company that ultimately the plant will again be operated.

The Jones & Hopkins Co., Nashville, Tenn., has been incorporated with a capital of $50,000. The business has heretofore been conducted as a partnership under the firm name of Jones & Hopkins. The charter was secured for the purpose of enlarging the business, which is that of dealers in stoves and manufacturers of sheet metal and tin cornice work. The following will be the officers of the company: President, John A. Jones; vice president, I. L. Pendleton; secretary and treasurer, A. M. Hopkins.

The American Car & Foundry Co.'s plant at Madison, Ill., has almost completed its repair contracts and will commence the manufacture of new cars on April 1. The first order of new cars on which work will be done is that of the C. N. O. & T. P. railway, for which 450 coke and 500 coal cars will be completed in 50 days. This order will be followed by one of 1,000 box cars for the Frisco system.

George A. Hebb, Newark, N. J., employed for a number of years by spring manufacturers, has established a plant at 70 William Street, Newark, N. J., for the manufacture of compression, extension and torsion springs. Special attention is given to experimental work where springs are required.

RECEIVED FROM THE TRADE.

In "A Short Story for Poultry Raisers," a recent and effective publication of the Union Fence Co., Eastern department, New Haven, Conn., some account is given of the evolution of wire fencing. The introduction of the principle of narrow spacing at the bottom and wider spacing at the top was a great advance, as made early by the DeKalb Fence Co., of DeKalb, Ill., but the same interests later organized the Union Fence Co., which for the first time made a fence combining all the features of a field fence, with spacing small enough for poultry yards. Each year for the past five years the production of this fence has doubled that of the preceding year, and instead of being made at DeKalb, Ill., alone, it is now woven at New Haven, Conn., and Oakland, Cal.

A booklet has been printed as a forerunner to the new catalogue of the American Air Compressor Works, of New York. Information regarding the foundation, erection and inspection of a compressed air installation, is digested and briefly submitted. A line of self-contained air compressors is described, with special attention to valve, governor and intercooler peculiarities.

Thomas Newcomen is the subject of the latest short story written by Dwight Goddard for the series sent out by Wyman & Gordon, of Worcester, Mass., and Cleveland. The tale is up to the high standard set by the previous publications.

The No. 5 catalogue of the Lake Shore Engine Works, of Marquette, Mich., includes hoisting engines, windlasses, sheaves with shafts and boxes, automatic skips, landing chairs, ore cars and buckets, turntables, etc. A few useful tables of value to those interested in mine equipment will doubtless tend to the preservation of the pamphlet.

Hutchinson roller bearings is the theme of a neat catalogue from the John Hutchinson Mfg. Co., of Jackson, Mich., and many forms of these bearings are illustrated. The catalogue also contains a description of a safety compression coupling of interesting design. Mention is made of the capabilities of the firm in roll grinding and corrugating, the manufacture of set collars, pulleys, shafting, etc.

The Foos Gas Engine Co., of Springfield, O., has just issued catalogue, No. 12, of gas and gasoline engines adapted to all power purposes. The engines are illustrated in portable, traction, and standard as well as special forms. The mechanism is very thoroughly illustrated and described.

The Meadville Vise Co., of Meadville, Pa., manufactures the Barrett horizontal cylinder boring machine in a variety of styles and sizes. These are shown in a recent catalogue, with numerous and excellent halftones. The machines are depicted with belt as well as electric drives. The machines in some cases are seen in operation on cylinders and motor frames, the work of boring and facing (three operations) being carried on simultaneously.

The D'Olier Engineering Co., of Philadelphia, has a bulletin of the Nordberg Mfg. Co.'s engines, air compressors, pumping engines and mine hoists. Some notable installations are shown. One of these is an engine designed for the Tamarack Mining Co., of Calumet, Mich. This hoist is designed to lift a total load of 42,000 pounds at the maximum speed of 5,000 feet per minute, the rock cars and their load weighing 16,000 pounds. The total lift of this hoist is 6,000 feet.

A pamphlet, K-104, describes pumping machinery for beet sugar factories and includes a brief discussion of the beet sugar industry and its mechanical features. The apparatus shown is the product of the Knowles Steam Pump Works, of New York.

General Catalogue, No. 2, of the Michigan Sprocket Chain Co., Ltd., of Detroit, Mich., enumerates standard detachable link chain belting, malleable iron buckets, sprocket wheels, elevator arms, etc. The Sterling clutch pulley, which has been illustrated in detail in *The Iron Trade Review*, together with other transmission and conveyor equipment, is found in the 127 pages of the pamphlet. The catalogue gives some attention to the important questions of advisable speeds and safe strains of chains, etc. An extended table of speeds will save some time and worry in the determination of rates.

The Lloyd, Adams & Sampson Co., manufacturer of patent toy pistols, has bought property at Portsmouth, O. The building will be remodeled and new machinery installed.

PERSONAL.

W. P. Snyder, of Pittsburg, who has been dangerously ill for several weeks, is now recovering.

O. D. Colvin, manager at Seattle, Wash., for the American Steel & Wire Co., has resigned to become manager of the Snoqualmie Falls & White River Power Co.

Charles M. Schwab returned to New York March 23 on the Kaiser Wilhelm der Grosse. He had spent a month in Europe.

John A. Gardner, formerly chief rate clerk of the New York office of Traffic Manager Young, of the American Sheet & Tin Plate Co., has been appointed assistant traffic manager of the National Steel & Wire Co., with headquarters at Bayonne, N. J.

Ray D. Lillibridge, New York, has returned from a two months' trip to the West which included the Pacific Coast and Colorado.

Henry James, for many years connected with the Pencoyd Iron Works and also the American Bridge Co., is now with the Philadelphia Roll & Machine Co. as roll designer and head of the roll department.

Francis J. Peck, of the firm of Crowell & Peck, mining engineers, of Cleveland, has returned from Joplin, Mo., after examining several mines in that district.

W. M. Leeds, first vice president of the American Sheet & Tin Plate Co., of Pittsburg, has resigned and has been succeeded by Charles W. Bray, chief engineer of the company and inventor of the Bray process of tin plate rolling. Mr. Leeds is at present in Spain and it is announced that he resigned on account of ill-health.

Reports that Col. George D. Wick, of Youngstown, would become president of the Youngstown Bolt Co. or the Youngstown Iron Sheet & Tube Co. are denied.

Robert Hubler, of Youngstown, has been appointed superintendent of the mill of the Elyria Iron & Steel Co., Elyria, O.

Obituary.

Edwin Augustus Miller died at his home in East Orange, N. J., March 22, of pneumonia, aged 36. He was senior partner of the iron and steel firm of Miller, Thornburgh & Co., of New York.

Robert McCurdy, of Youngstown, O., who was financially interested in many iron and steel projects which made that city one of the great iron and steel producing centers of the country, died at his home on Friday, March 25. He was born in Ireland, June 24, 1842, and the same year was brought to this country. Early in life he became connected with the banking business at Youngstown and became interested in the firm of Tod, Stambaugh & Co. at its organization, through his banking connections. He became a partner in the firm of Cartwright, McCurdy & Co., which operated a rolling mill in Youngstown in the early 70's. This concern afterwards was consolidated with the Youngstown Rolling Mill and the combination was known as the Union Iron & Steel Co., which was absorbed by the American Steel Hoop Co. and is now owned by the Carnegie Steel Co. He is survived by his widow and three children.

It is reported that half of the workmen of the Scranton, Pa., plant of the American Locomotive Co. have been discharged and that the plant will hereafter be used only for repair work, the new construction to be done at Schenectady, N. Y. C. F. Bookman, chief draughtsman at Scranton, has been transferred to Schenectady. The officials at Schenectady decline to make any statement concerning the company's plans, but a New York official has been quoted as saying that the cutting down of the force at its Scranton plant is simply in accordance with the company's policy to reduce the working force from time to time at those plants in whose territory the business is temporarily reduced.

The pipe foundry of the Minnequa plant of the Colorado Fuel & Iron Co. resumed operations March 28. It was the first of all departments to close down because of the large stock on hand. Blast Furnace C of this company, recently blown in, is now producing 220 tons of iron in 24 hours. Good progress is being made by the contractors of F furnace at Pueblo.

DETAILS OF THE GERMAN STEEL SYNDICATE.

The German Steel Syndicate, whose organization and the names of its 28 members with their allotments were given in the March 3 issue of *The Iron Trade Review,* has been incorporated under the name of the Stahlwerksverband Actiengesellschaft, with headquarters at Dusseldorf, Germany, and a capital of 400,000m. The agreement between the syndicate and the steel producers which expires on June 30, 1907, covers:

1. The entire output of the steel works of:

(a) Unfinished steel, including that made by the Thomas, Bessemer, Siemens-Martin, Tiegel or any other process.

(b) Puddled material.

2. The entire purchased requirements of the steel works consisting of:

(a) Unfinished steel (including all forms of unfinished steel and puddled material in general), and,

(b) Half finished steel products required in producing the products enumerated in clauses 3 and 4.

All of the material coming under this second clause is known as "Zukaufs Rohstahl," while the unfinished steel produced by the steel works and referred to in clause 1 is known as "Eigen-Rohstahl." Note.—This clause is to cover such requirements of steel as is purchased from one steel works by another, and has special reference to the purchases of finishing mills and covers all purchases made by the mills among themselves.

3. The entire output of the steel works in the following rolled products:

(a) Half finished products, such as ingots and slabs that have been given a preliminary rolling, billets and bars.

(b) Heavy railroad material such as railroad and grooved rails, including heavy rails from 15 kg. and over to the meter in weight; railroad ties 15 kg. and over to the meter in weight; tie plates and splice bars for the above named rails and ties; plates and bars for fastening rails to the ties.

(c) Light railroad material including rails lighter than 15 kg. to the meter, ties under 15 kg. to the meter and tie plates and splice bars for the same.

(d) I beams, channels and other shapes 80 mm. and over in height.

(e) Such materials as are known under another name but which could be produced on these roll trains, and which from their nature belong to the same class as the above named products.

4. The entire output of the steel works of the following products:

(a) Bars, including universal plates and flat bars, skelp and switch plates; rounds and squares; all other bar shapes and hoops and bands.

(b) Rods and wire.

(c) Plates 5 mm. thick and heavier, sheets of all kinds under 5 mm. thick, corrugated sheets and floor plates of all kinds.

(d) Pipes and tubes.

(e) Railroad car axles, wheels and tires, forgings, steel castings, rolls, and all other products made direct from the unfinished steel, and not finished from the finished products enumerated in clauses 3 and 4.

5. The entire requirements of steel works of half finished products noted in clause 3, provided the finished material made from this steel is sold through the syndicate.

All of the material noted in clauses 1 and 2 to be shipped in the form of ingots and muck bars, as well as steel for producing the finished material noted in clause 3 in the finishing department of the steel works, is known as unfinished steel, class A, and unfinished steel, class B, covers steel used in the finishing department of the steel works for producing the rolled products enumerated under clause 4. By this division, products A cover unfinished steel and puddled bar for shipment, as well as the rolled products finished by the steel mills under clauses 3 and 5, while products B cover material thus rolled and indicated under clause 4. The steel works sell the syndicate, each steel works selling this material through syndicate in turn is obliged to sell. Products B are not sold to the syndicate, each steel works selling this material through its own selling department or through associations organized for that purpose, or which are yet to be organized.

The allotments of steel to be produced by the various members of the syndicate are fixed covering both classes A and B, and there is also a division of these allotments covering not only the steel that is produced and finished by a mill but that which is purchased as well. The prices paid for the material coming under the head of products A are fixed by the syndicate and will of course vary with market conditions.

The output of unfinished steel of the concerns in the syndicate last year is estimated at 7,750,000 tons, as compared with an estimated output of 8,820,000 tons of all the German steel works during 1903, and provided the Phœnix and Westfalien works become members of the syndicate the output of the syndicate plants will be 88.5 percent of the total German production. On the other hand if these two mills refuse to affiliate with the syndicate, the works that have already entered into the agreement will produce, according to the output of 1903, 83.5 percent of the German production.

The St. Louis Model Foundry.

Plans for the building containing the model foundry and the foundrymen's headquarters which will be established and maintained in connection with the department of mines and metallurgy during the St. Louis Exposition have been submitted by a number of persons. These will be considered by the members of the executive committee, representing the different foundry associations, which has this matter in charge. The foundry is to be maintained and as far as practicable operated under the rules and regulations of this committee and by persons whom it may appoint. The statement has been circulated that the foundry will be under the management of the Worcester, Mass., Polytechnic Institute but this is premature, at least. No appointment has yet been made though it is quite likely that the name of some instructor or student from the institute will be presented for consideration by the committee. The following is a list of the two model foundry committees: Executive Committee—O. P. Letchworth, Buffalo, N. Y., National Founders' Association; Richard Moldenke, New York, American Foundrymen's Association; E. E. Brown, Philadelphia, Philadelphia Foundrymen's Association; Henry A. Carpenter, Providence, R. I., New England Foundrymen's Association; A. W. Slocum, Pittsburg, Pittsburg Foundrymen's Association; F. C. Schwedtmann, St. Louis, St. Louis Foundrymen's Association. Finance Committee—A. E. McClintock, Detroit, Mich., secretary National Founders' Association; Richard Moldenke, New York, secretary American Foundrymen's Association; Howard Evans, Philadelphia, secretary Philadelphia Foundrymen's Association; F. F. Stockwell, Cambridgeport, Mass., secretary New England Foundrymen's Association; F. H. Zimmer, Pittsburg, secretary Pittsburg Foundrymen's Association; Wm. Medart, St. Louis, secretary St. Louis Foundrymen's Association.

A meeting of iron and steel manufacturers, railroad men, engineers and others interested was held last week in Philadelphia, and decided upon a plan for entertaining members of the Iron and Steel Institute when they visit this country next October. John Fritz, chairman, and Theodore Dwight, secretary of the national committee on reception, were present. A permanent organization was perfected by the election of William Sellers, chairman; Leonard Peckitt, vice chairman; Walter Wood, treasurer; and John Birkinbine, secretary. An executive committee and a finance committee were authorized.

The Allis-Chalmers Co. has acquired the Norwood foundry of the Bollmann-Wilson Foundry Co. and will take possession of the plant on April 1. This foundry made many of the castings for the Bullock Electric Co., which was recently absorbed by the Allis-Chalmers Co.

The mill of the Cumberland Sheet & Steel Co., of Cumberland, Md., has been shut down for an indefinite period.

W. A. Dunn has been appointed receiver for the Mechanical Machinery Co., Milwaukee, Wis., the stockholders of the company conceding it to be insolvent. Liabilities are about $4,100 and the assets are estimated at $2,600.

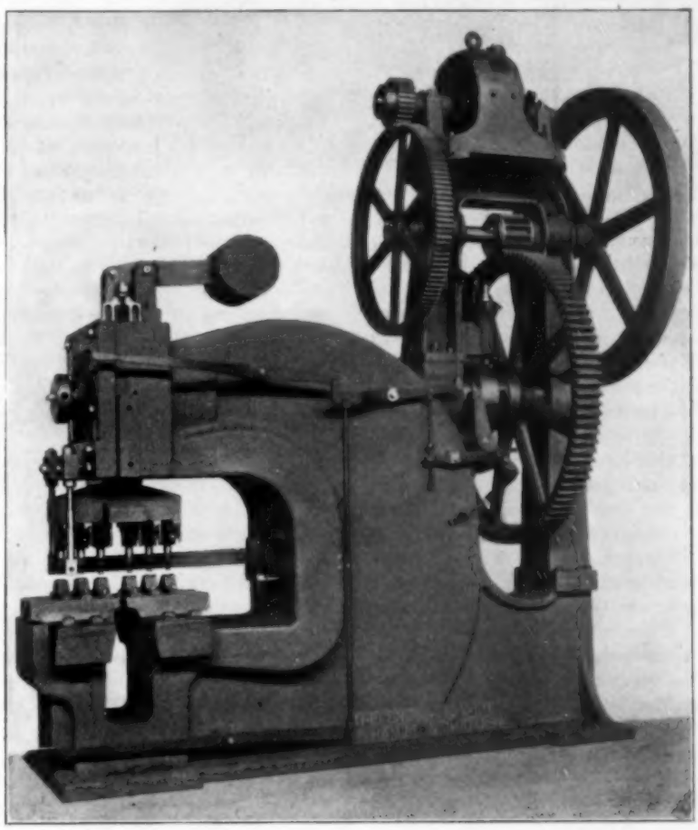
ASSOCIATED FOUNDRY FOREMEN OF ERIE, PA.

The Associated Foundry Foremen of Erie, Pa., gave their first annual banquet on the evening of March 19. The shop owners were the guests of their foremen as were also several chemists. The elaborate menu served included "Pemartin Sherry in Swab Pots," "Loam Bricks," "Core Paste Sandwiches," "Soft Brushes," "Well Mixed Clay Wash," "Castings," and "Cigars with good Vents." The following toasts were responded to: The American Foundrymen's Association, Willis Brown, president; How Shall We Best Promote the Foundry Interests of Erie? Hon. William Hardwick, Mayor; The Relation of Patternshop and Foundry, Henry L. Post; What Assistance Should Be Given the Foundry to Attain the Best Results? Thomas E. Durban; Education in the Foundry, The Associated Foundry Foremen, James A. Murphy, National Secretary; The Importance of the Foundry as Compared With Other Departments of a Manufacturing Concern, John R. Whittemore; Advantages of Local Foundrymen's Associations, J. S. VanCleve; What Benefits Are to Be Obtained by Mixing Irons by Chemical Analysis? Mr. Henry C. Pritham; The Erie Foundry Foremen's Association, Harry E. Kies, secretary. The following were present: William F. Grunau, Erie City Iron Works; Charles Lindahl, Stearns Mfg. Co.; James A. Murphy, Ball Engine Co.; Frank C. Berchtald, Erie Engine Works; George Wilkins, Griswold Mfg. Co.; William Haak, Jarecki Mfg. Co.; John Harmley, National Foundry Co.; Jacob Schwab, Skinner Engine Co.; Fred Graf, South Erie Iron Works; Frank Carrick, Globe Iron Works; Adam W. Link, Erie Foundry Co.; James Crane, Erie Foundry Co.; Charles Urick, Walker Foundry Co.; Harry E. Kies, Erie Malleable Iron Co.; Thomas E. Durban, John R. Whittemore, and Henry L. Post, Erie City Iron Works; J. S. Van Cleve and John R. McDonald, Erie Foundry Co.; William Hardwick and F. L. Cleveland, Erie Engine Works; James D. Hay and E. P. Rossiter, Cascade Foundry; Matthew Griswold, Griswold Mfg. Co.; Henry C. Pritham, chief chemist, Erie Laboratory; Charles C. Davenport and E. W. Shelden, National Foundry Co.; Willis Brown, president American Foundrymen's Association; E. E. Walker, Erie Malleable Iron Co.; A. A. Claus, Globe Iron Works; William Schaubacker, Walker Foundry Co.; G. L. Seahl, Stearns Mfg. Co.; Samuel Heiss, South Erie Iron Works.

COMBINED PUNCH AND COPING MACHINE.

A combination machine built by the Long & Allstatter Co., of Hamilton, O., is shown in the engraving. It is a heavy I-beam multiple punch and a coping machine combined. It is illustrated with tools in place for punching six holes simultaneously in the web of a beam. When these punches are removed coping tools are readily attached for coping the ends of beams, or shearing blades of any kind can be used. The punches are arranged with gags so that any punch can be placed in operation by withdrawing the gag. The stripper bar on the near side of the machine has been removed in order to show the punches, dies, etc. The other bar is in place and explains the relation of the punching equipment as a whole.

The machine is motor driven and for economy of space the motor is located on top of the frame. The tool has steel slide, automatic stop, steel faced clutch jaws, etc., and is made to carry punches 48 inches from center to center of the outside holes and will cope the heaviest 24-inch I-beam. The action is under perfect control by the motion of the slide at any point in the stroke.



MULTIPLE PUNCH AND COPING MACHINE.

There is much satisfaction at Ensley, Ala., over the definite announcement that the Alabama Steel & Wire Co. will resume operations at its plant at Ensley in about two weeks. The leading citizens of Ensley met Mr. Schuler of the company a few days ago and discussed with him the obstacles to opening the plant. Mr. Schuler addressed the meeting, stating that in order to start the plant at once it would be necessary to buy steel billets at Pittsburg, as the Gadsden plant would not be making steel for 90 days or more. A committee of five was appointed to confer with him and arrange the details for starting the plant. After the meeting Mr. Schuler gave orders for the necessary repairs and directed that the plant be put in operation at the earliest date possible, which will be about April 14.

The Standard Machine Co., Providence, R. I., manufacturer of jewelers' machinery, screw machines and roller bearings, is to establish a branch at Buffalo, N. Y., and has leased space in the Hamilton building which it will occupy May 1.

REVERSING COUNTERSHAFT WITH ONE BELT.

The one belt reversing countershaft is designed to drive screw machines, monitors, engine lathes or other machine tools requiring a forward and reverse drive and, as the name suggests, one driving belt from the line shaft is sufficient to provide a drive in both directions. As all other reversing countershafts use two driving belts on each countershaft, one for driving ahead and one for reversing, it is evident that a one belt reversing countershaft avoids much of the annoyance and danger of a crowded line shaft. The reversing countershaft is shown complete in Fig. 1, and Fig. 2 illustrates the working parts as they appear when disconnected and scattered along the shaft after the cone pulley has been removed. A sectional view of the reverse mechanism is given in Fig. 3.

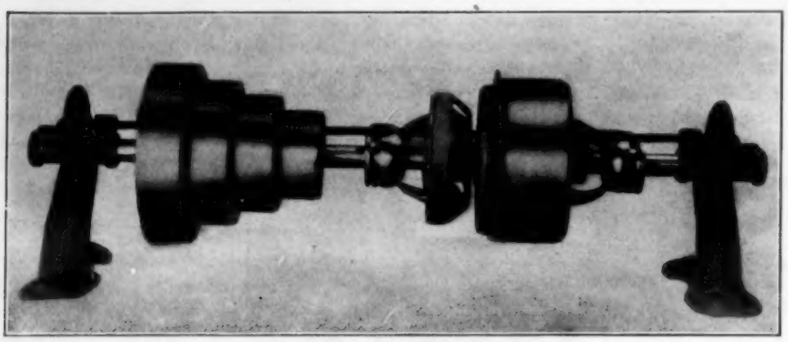


FIG. 1.—A REVERSING COUNTERSHAFT WITH ONE BELT.

The pulley G is webbed and has cut in its rim an internal gear. The web of the pulley forms the inner wall of the gear chamber and the casing C forms the outer wall and also makes an extended hub for the pulley, compensating for that portion of the hub cut away to make room for the spur gear F, which is keyed to the shaft in line with the internal gear. Meshing in the internal and spur gear are three fiber pinions E set equidistant about the spur gear and running on the studs M, which are held by the three-armed spider D. B is a friction rim held stationary at all times, the hub of the spider running freely in it. A is a cone friction threaded to the hub of spider D and capable of being clutched to the rim friction B, thus holding the spider stationary, giving the reverse drive. Friction H is keyed to the shaft and held in position by headless set screws. The spools L slide on the shaft and are operated by shipper forks on a shipper rod which is supported by the hangers. The fingers K when operated by the spools draw the friction surfaces together. The rings I threaded on the hubs of the pulleys and friction rim B are the adjustments. Rings J rotate with the fingers and prevent them from wearing a groove in the adjusting rings, and thereby destroying the adjustment of the frictions. Between the rings I and J are fiber chafing rings. When the frictions are not engaged they are prevented from coming in contact with each other by music wire springs. These are shown in the hub of casing C and friction rim B.

To drive the countershaft ahead, the shipper is moved to the left engaging the friction H with the pulley G. The pulley is clutched directly to the shaft and the countershaft runs ahead without gear action. To reverse the countershaft, the shipper is moved to the right and frictions A and B are clutched together. As B is held stationary, it will be seen that the spider is prevented from rotating, the fiber intermediate pinions reversing the direction of the drive of the internal gear and transmitting it to the spur gear which is keyed to the shaft, thus driving the countershaft in the opposite direction to that in which the pulley is being driven by the belt. When the shipper is midway between the two throws it leaves both frictions disengaged and the pulley rotating freely on its bearing.

Frictions of the cone type are used in the construction of the countershaft, though a new method of operating and adjusting is employed which reduces the space usually required for the frictions and adjustments, shortening the countershaft by a foot or more, giving greater rigidity. The frictions when engaged impart no strain or thrust to the shaft, in fact the shaft can be removed without disturbing the frictions. When the frictions require adjusting the headless set screws in the rings I are loosened and the rings slightly advanced on the hubs. The rings are easily reached through the spokes of frictions H and A.

To render the gears in the one belt reversing countershaft noiseless, when running at a belt velocity of from 1,000 to 1,500 ft. per minute, necessitated much careful study and experimenting. Many obstacles were met before the desired results were obtained. The builder made an enemy, sound, their servant, for it is by the aid of sound that the quietest running positions of the fiber pinions are located. This is done with special appliances while the countershaft is running at a belt velocity of 1,700 feet per minute. All gears used in the device have planed teeth and run in a bath of oil which silences what gear noise might be discernible after the countershafts have passed through the "tuning" process. As the intermediate pinions are of fiber no metal gears are running together and the fiber pinions run on steel studs.

The method of oiling the one belt reversing countershaft is an interesting one. As will be seen by referring to Fig. 3 the casing C is secured tightly to the side of the pulley which is webbed. This makes a chamber in which the gears are located and which serves as an oil reservoir from which all bearings are lubricated excepting the hanger boxes which have oil reservoirs of their own. The oil is drawn along the pulley hub by spiral grooves until it nears the outer end of the bearing where it is met by another groove leading in the opposite direction, which forces the oil outward through a hole back into the gear chamber.

So complete is the circulation of oil that if the retarding grooves are omitted and the oil allowed to escape, the gear chamber will become emptied in a few hours. The oil chamber shown in the hub of spider D serves to oil the bearing of the spider and also the bearing of friction B. All bearings are provided with retarding grooves which prevent the oil from working along the bearings and dripping on the belting.

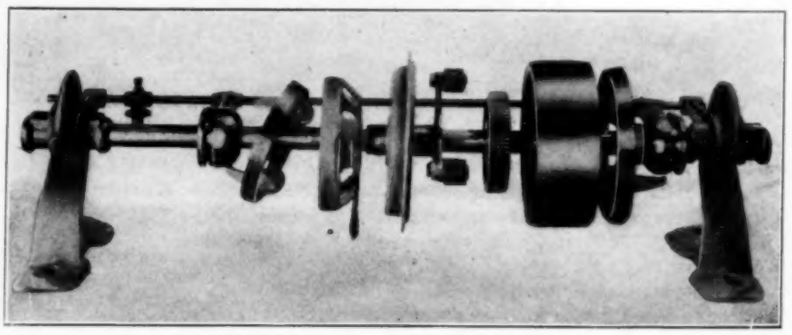


FIG. 2.—REVERSING MECHANISM DISSECTED.

A noteworthy advantage in a single belt transmission is on such tools as screw machines, lathes, etc., which are subjected to sudden and constant reversing. Belts for such purposes are run at high tension in order to prevent them from being thrown from the pulleys by the shock of reversal or driving to idler belt as the case may be. The driving belt with the new countershaft is under the same tension conditions whether the machine tool is running ahead or backing and is hugged close to the pulley surface. The difference between one and two tight driving belts on the same countershaft will be very evident to the mechanic.

The one belt reversing countershaft is manufactured by the Smith Countershaft Co., of Melrose, Mass.

WROUGHT IRON BY THE REYNOLDS PROCESS.

The Reynolds Steel & Iron Co., Albany, N. Y., will manufacture wrought iron by the Reynolds process, which is described as follows by James N. Whitman, of Albany, in the *Bulletin* of the American Iron and Steel Association:

The Reynolds process for making wrought iron resembles in practice and product that of the old "Catalan Forge." Improvements made by the substitution of pulverized bituminous coal for fuel in place of charcoal, mechanical action of the rotary furnace in place of skilled labor, and adaptability to mechanical handling of all material have resulted in cheapening the cost of a very desirable product, and have brought forged blooms and bars within reach of the makers of crucible and open-hearth steel and of manufacturers of iron bars of superior quality.

In practice the finely pulverized ore is intimately mixed with finely pulverized carbonaceous material, then charged into the body of a rotating furnace, where the ore and carbon are most thoroughly exposed to the heat necessary to deoxidize and carburize the ore. After the ore has been reduced in a CO atmosphere the flame is changed to CO^2 and the reduced ore is decarburized and brought up to a heat sufficient to weld the material into one solid ball ready for the hammer and squeezer. Practice has shown this to be an exceedingly simple, short, and perfect operation. The use of pulverized coal makes it possible to obtain a flame neutral at all times to the operation being carried on in the furnace, it being practical to secure and maintain for as long a period as required either CO or CO^2 flame. As there are no additions to introduce impurities

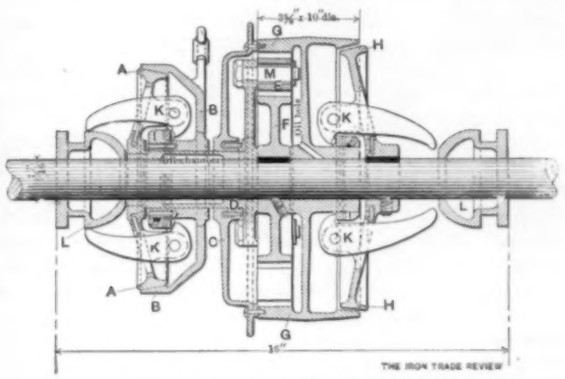


FIG. 3.—SECTIONAL VIEW OF REVERSING COUNTERSHAFT.

in the finished product there is no reason why wrought iron produced by this process should not be as good chemically as the ore from which it is made.

Experiments made with a furnace of full capacity using "Chateaugay concentrates" produced a bar which forged and welded well both at a very low and a very high temperature. The bars proved to be very strong cold, and resemble in appearance and manner of working Swedish iron bars. There were no facilities at hand for squeezing or rolling the balls produced in the furnace. These had to be reheated and worked under the hammer, so that in the material actually made but little of the scoria has been removed. In practice the slag and scoria would of course be expelled in the squeezing and rolling operations in the customary manner.

There are many iron ores in which impurities are not chemically combined, and to remove which it is necessary to crush the ore to a fineness which makes it impractical for use in the blast furnace without briquetting. By the Reynolds process the more finely divided the ore particles are the more economical is their treatment in the furnace, so that many large deposits of ore which are now of little or no value would be those which are more adaptable for treatment by this process.

There is no doubt whatever as to the great advantage of the intimate mixing of the fine particles of ore and carbon. Since deoxidation and carburization take place only at the point of contact, indefinitely multiplying these points wonderfully increases the speed of the operation. Actual practice has proved that the ore can be converted into wrought iron of a superior quality in a remarkably short time and at a great saving, both in labor and material, over any other process.

EASTERN PENNSYLVANIA.

HARRISBURG, March 29.—Iron and steel works in the Susquehanna, Schuylkill and Lehigh Valleys are recovering from the effects of the flood and it is found that with the exception of the bridges the damage was small. The railroads got out all right after some grading and few mills suffered heavily, the greatest damage being in the delays in getting out orders. The damage done to bridges is immense. The State will have to spend a million dollars at least to replace the bridges carried away and the railroads have sustained heavy loss in this respect. The bulk of the loss to the State will fall along the Susquehanna river where some big structures were washed away. Some of these, however, were old timers which will be replaced with new steel bridges. The Danville Stove Works lost many of their patterns and considerable property was washed by snow and ice.

Almost all of the iron works between Sunbury and Columbia were compelled to shut down by the rampage of the Susquehanna. In most instances the suspensions were for a week at a time. In and about Harrisburg many works were idle and three blast furnaces had to be banked because they were surrounded by water. None was damaged by the flood or ice.

The Pennsylvania Steel Co. has started its Bessemer and rail mills after a short suspension. The rail mills have been considerably improved in the manner of handling the rails.

The Harrisburg Mfg. & Boiler Co. has started its new departments on double turn and is occupying a large new building. The company has taken a number of orders for pipe for foreign delivery. Last year it sent pipe to Mexico, Peru and Spain, the material being for drainage of mines.

The National Tube Co. stopped work at its Middletown plant this month and there was some damage done by water.

It is understood that the plant of the Eddystone Foundry & Machine Works, formerly the Gruson Iron Works, will be started soon by a new company. The Sterlingworth pressed steel car interests may also erect a plant along that part of the Delaware.

The Glenville foundry, near York, is to be put into operation by Miller and Beard, residents of Hanover. The plant has been idle for some time.

The Diamond Drill & Machine Works at Birdsboro are increasing their steel output. Improvements have been under way for some time at the plant and it is said that there is plenty of work. A specialty of big castings, including some for steamships, is being made.

In the Lehigh Valley things are picking up a bit. Many of the mills have more orders than for a long time and some of them look forward to a busy spring. The Thomas Iron Co. has started two more stacks, one at Lock Ridge and another at Hellertown, and preparations are being made to start others when the time comes.

The Carlisle works of the Standard Chain Co. were burned recently and the loss will be large. The company has not yet announced its intention, whether to rebuild or not.

The Geiser Mfg. Co. and several other concerns at Waynesboro in the Cumberland Valley have been making shipments to South Africa since the first of the year. They are making considerable farm machinery for the Transvaal.

It is estimated that tnere will be considerable buying of pig iron and structural material in this part of the State because of large orders for construction work in the East. Inquiries are being made at mills and the furnace men are figuring on some contracts.

Joseph Ramsey Jr., president of the Wabash railroad, announces that his company has made a contract with the Carnegie Steel Co. whereby it obtains 25 percent of the tonnage of that company in or out bound. The tonnage thus guaranteed to the Wabash will, it is estimated, amount to 4,000,000 tons.

The Milwaukee Tack Co., Milwaukee, Wis., has been forced into bankruptcy upon petitions of the Norton Iron Works, of Ashland, Wis., the Schoellpoff, Hartford & Hanna Co., of New York, and the O'Neil Oil & Paint Co., of Milwaukee. William T. Doyle was appointed receiver.

Blast Furnace Slag as a Structural Material.*

BY JOSEPH A. SHINN.

During the year 1903, there was produced in the United States upwards of 10,000,000 gross tons of blast furnace slag, a quantity sufficient to cover 2,000 acres, or more than three square miles, to the average depth of three feet, if in the form of broken stone. Of this quantity, a few hundred tons were used in the manufacture of slag wool; less than 75,000 tons in the manufacture of Portland and Pozzuolani cements, and possibly 1,000,000 tons as substitutes for broken stone, gravel for roofing, etc. The balance, or more than 9,000,000 tons, was deposited in low ground or unsightly heaps near the furnaces, or was used by railroads for embankments and ballast. Of the total quantity produced, 45 percent was produced in the State of Pennsylvania, and 23½ percent, or more than 6,000 tons per day for every day in the year, was produced in Allegheny County. At no other place in the world is an equal quantity produced in so limited area. The whole of this latter quantity could be utilized with a gain in quality of structures produced, or at a saving of cost, or both.

First Uses in Building.

As early as 1770, granulated slag was recognized as furnishing a material of very superior quality for the making of mortar as compared with common sand. From about 1820 to 1870, numerous attempts were made in England to utilize the slag commercially, by casting it into block for road paving, but with indifferent success. In 1840, Edward Parry, of Wales, commenced the manufacture of slag wool, but it was not until its manufacture by Krupp, at Essen, and Luurman, at Georgomarienhutte, in Hanover, about 1875, that it became a recognized commercial product. In 1870, Mr. Fritz Luurman, a well known furnace engineer, began the manufacture of bricks at Osnabruck, Germany, using 90 per cent to 94 per cent of granulated slag, and 6 per cent to 10 per cent of common lime. Of these bricks Mr. Luurman says: "They are adapted to all kinds of subaqueous and subterranean foundation work, as well as to superstructure, and their refractory qualities make them suitable for the linings of lime kilns, and boiler furnace stacks, and for hot blast stoves." In 1873, the Tees Slag Co., of Middlesboro, England, began the manufacture of these bricks, but instead of using lime for the matrix, they prepared a crude slag cement, made by the wet process consisting of 70 per cent granulated slag, 15 per cent lime hydrate, and 15 percent of calcined iron ore, ground to about 60 mesh, and used 15 per cent of this mixture with 85 per cent granulated slag in making bricks, making the lime addition about 2.15 per cent of the whole. They also executed a number of engineering works in concrete, using this crude cement for the matrix and broken hard slag for the aggregate; among the the early structures being a six-story mill building; the foundation for a 100-ton steam hammer; arches under a large brick station and platform for the London & Great Eastern railroad, and a number of foundations for rolling mill machinery. The manufacture of slag bricks is now carried on in all of the iron producing districts of Europe. This industry, together with cement and aggregates, consumes a large part of the slag produced.

In 1883, a patent was issued to Bosse & Walters, of Germany, for a cement consisting of 85 per cent granulated slag and 15 per cent common lime hydrate, ground together to a fineness of 90 per cent, through a 200 mesh screen. The term Pozzuolani cement has been given to this product because of the similarity of physical appearance and hydraulic action of Pozzuolani and furnace slag. Pozzuolani is of volcanic origin, and was produced by the molten lava coming in contact with water during its eruption. Its chemical constituents are mainly silica, alumina and iron, lime being present usually to the extent of 3 per cent and seldom over 6 per cent. Pliny and Vitruvius mention that during the time of the Roman Empire, Pozzuolani was used in place of sand, in the construction of some of the viaducts and acqueducts which have stood for centuries and parts of which are still in existence, monuments of engineering skill. At Pozzuola, a breakwater, consisting of 24 arches, was constructed of brick, faced with stone, the mortar for which consisted of Pozzuolani and common lime. Although constructed more than 1800 years ago, 13 of these arches are still standing above water.

As in slag, the silica in Pozzuolani is soluble in the presence of lime, and to this fact is due its hydraulic quality. In modern times hydraulic cement has been made by grinding Pozzuolani and mixing it with lime hydrate in the same manner as is now done for slag cement.

Mixing Slag and Cement.

For many years it has been the practice of some of the manufacturers of Portland cement in Germany, whose works were located near blast furnaces, to mix a quantity of granulated slag with their cement. It was claimed that it not only cheapened the product, but that it materially improved the quality of the cement. The latter claim was denied by those not using slag and resulted in the adoption of a definition for Portland cement by the Verein Deutscher Portland Cement Werke, which excluded from membership those using slag. With the further development of the Portland cement industry, slag was in some works substituted for marl and limestone, in the manufacture of Portland cement, and was found to be capable of producing a stronger cement than the latter materials. The term "Eisen Portland cement" was applied to the new product. This was followed by the organization of the Verein Deutscher Eisen Portland Cement Werke, embracing those who made Portland cement from slag, and those who mixed slag with either kind of Portland cement. It is claimed by the latter association:

First.—That Portland cement made from slag is stronger than when made from marl or limestone, and

Second.—That the addition of 30 per cent of granulated slag to any Portland cement adds materially to its strength while reducing its cost.

These claims have received recognition by such authorities as Tetmajer of Zurich, Michaelis of Berlin, Le Chatelier of Paris, Passow of Hamburg, and Mr. J. H. Stead, member of the British Institution of Civil Engineers, of Middlesboro, England; and in the report made to the Swiss Government by Dr. L. Tetmajer, Director of Tests of Building Materials at the Swiss Polytechnic School of Zurich, he says of slag Pozzuolani cement: "I consider slag cement a binding material, par excellence."

Literally interpreted, it was intended to convey the opinion that it was equal to the best Portland cement, if, as previously stated by him, it was supplied with a sufficient quantity of water during the early period of induration, it requiring more water than Portland cement at the time.

Regarding the theory of the deleterious influence of sulphur in slag cement, Dr. Tetmajer says: "I have yet to learn of an authenticated instance of injury to a structure in slag cement, due to the presence of sulphur."

Comparative Tests.

Stahl and Eisen for March 15, 1903, contains a paper by Jantzen, Director of Works at Wetzler, read before the Union for the Advancement of Industrial Activity, February 2, 1903, in which he gives the following comparative tests:

TABLE I.

ALL BRIQUETTES 1 PART CEMENT, 3 PARTS STANDARD SAND.

Tensile strength in lbs. per sq. inch.

	3 Days	7 Days	14 Days	3 Mos.
Portland—pure, in water	202	294	333	425
" 70 per cent, fine ground slag, 30 per cent in water	182	284	384	524
Gain per cent.			14.7	23.5
Portland—pure, in air	196	302	376	490
" 70 per cent, fine ground slag, 30 per cent in air	253	364	496	602
Gain per cent.	30.0	20.7	32.0	23.0
*Portland—pure, in water	217	193	214	333
" 50 per cent fine ground slag, 50 per cent in water	215	335	386	505
Gain per cent.		74.0	80.0	57.6
*Portland—pure, in air	275	309	373	364
" 50 per cent, fine ground slag, 50 per cent in air	348	335	416	516
Gain per cent.	26.5		11.7	41.7

*Contained excess of free lime, probably due to under burning.

*Read at the meeting of Structural Section of Engineers' Society of Western Pennsylvania, March 22, 1904.

A more marked illustration of the effect of adding slag to Portland cement is furnished by the following comparative tests of an under-burned Portland cement, and the same with the addition of 50 percent slag:

	3 Days	7 Days	28 Days
Under-burned Portland 1, sand 3	0	60	109
Same, with 50 per cent slag 1, sand 3	107	206	373
Gain, per cent	.....	304.0	242.0

These results would indicate that the cement was not burned at a heat greater than that required for natural cement, the strength at 28 days being about that of such cements, while the strength of the slag mixture is equal to that of a good Portland cement.

The average of the tests made at those works for two years, the product being a Portland cement made from slag, with the addition of 30 percent of granulate, is as follows:

TENSILE STRENGTH PER SQUARE INCH, CEMENT 1, SAND 3.

	In Water			In Air		
	3 Days	7 Days	28 Days	3 Days	7 Days	28 Days
1901	172	219	314	207	295	359
1902	205	244	335	238	321	408

Fine ground granulate made into a mortar with 30 per cent of a 4.6 per cent soda solution, and without any lime, may set in the air for 7 days, and immersed in a 3 percent soda solution for 35 days, give a tensile strength of 285 pounds.

Fine ground granulate made into blocks and set under pressure without lime or other chemical additions gave crushing strength of 560 to 700 pounds per square inch, at 6 months.

Stahl & Eisen, for Aug. 1, 1903, contains a paper read by Dr. Passow, of Hamburg, before the International Congress of Applied Chemistry, at Berlin, in which he gives the following comparative tests:

TABLE II.

ALL BRIQUETTES 1 PART CEMENT, 3 PARTS STANDARD SAND.

Cements	Hardening	Age	Tensile Lbs.	Tensile Gain per cent	Crushing Lbs.	Crushing Gain per cent
Common Portland	In water	7 days	230		2172	
Eisen "	" "	7 "	227		2442	12.5
Eisen " 70 per cent granulate slag, 30 per cent	" "	7 "	272	18.0	2868	32.0
Common Portland	In air	7 "	281		2116	
Eisen "	" "	7 "	360	28.0	2882	36.0
Eisen " 70 per cent granulate slag, 30 per cent	" "	7 "	376	33.8	3394	60.0
Common Portland	In water	28 "	281		2563	
Eisen "	" "	28 "	312	11.0	3646	42.0
Eisen " 70 per cent granulate slag, 30 per cent	" "	28 "	359	28.0	3723	45.7
Common Portland	In air	28 "	419		3072	
Eisen "	" "	28 "	462	11.0	3234	5.3
Eisen " 70 per cent granulate slag, 30 per cent	" "	28 "	378	10.0	4083	32.6
Eisen Portland	In water	7 "	305	32.5	2706	
Eisen " 54 per cent granulate slag, 46 per cent	" "	7 "	284	23.5	2422	11.5
Eisen Portland	In air	7 "	344	22.5	2847	34.5
Eisen " 54 per cent granulate slag, 46 per cent	" "	7 "	299	6.4	2596	22.6
Eisen Portland	In water	28 "	457	63.0	4471	74.5
Eisen " 54 per cent granulate slag, 46 per cent	" "	28 "	403	75.7	4218	64.6
Eisen Portland	In air	28 "	534	27.4	4164	52.1
Eisen " 54 per cent granulate slag, 46 per cent	" "	28 "	429	2.4	3780	23.1

Gain per cent shown is that compared with common Portland cement same age and condition.

The additions of slag granulate were ground with the clinker.

Table III shows comparative tests of common Portland, Eisen (slag) Portland, Portland mixed with fine ground slag granulate and Slag Puzzuolani cements.

TABLE III.

ALL BRIQUETTES 1 CEMENT, 3 SAND; IN AIR 1 DAY, BALANCE OF TIME IN WATER.

LBS. PER SQUARE INCH.

	Tensile				Crushing			
No.	7 Days	28 Days	3 Mo.	1 Year	7 Days	28 Days	3 Mo.	1 Year
1	230	281			2172	2563		
2	302	402	472	560	2930	3030	3770	3926
3	250	322	408	490	3002	2926	3654	3968
4	249	321						
5	227	312			2442	3646		
6	305	457			2706	4471		
7	272	359			2868	3723		
8	284	403			2422	4218		
9	230	370	462	560	1764	3030	4116	4030
10	196	356	434	518	1490	3052	4200	4872

1.—Common Portland from Table II.

2.—Common Portland. Average of ten series of tests giving more than 224 pounds each, at seven days, from table including 36 series of 20 Standard European cements by Tetmajer.

3.—Average of the whole 36 series of tests.

4.—Average of 30 briquettes each, of 8 standard brands of American Portland cement. Tests by Pittsburg Testing Laboratory, Ltd.

5.—Eisen Portland, from Table II, first series.

6.—Eisen Portland, from Table II, second series.

7.—Eisen Portland, with 50 percent slag, from Table II, first series.

8.—Eisen Portland, with 46 percent slag, from Table II, second series.

9.—Slag Pozzuolani cement. Average of nine series of tests, giving more than 224 pounds each, at seven days, from table including 19 series from 9 European slag cement works, by Tetmajer.

10.—Average of the whole 19 series.

Results of Experiments.

For the manufacture of slag Pozzuolani cement, all authorities agree that the slag should be highly basic, the furnace working hot, and that the quicker the slag is quenched the better the cement. The ordinary method of granulation is by running the molten slag into a tank of water, in connection with a stream of water under low pressure (usually jacket water) for the purpose of breaking up the mass and supplying the loss due to evaporation. The chemical analysis of granulated differs slightly from that of air-cooled slag, usually showing a slight loss of sulphur. According to Tetmajer, the physical condition undergoes a marked change, the elements being more or less dissociated acording to the rapidity of the quenching, and the silica being rendered quite soluble in the presence of free lime. LeChatelier also discovered that granulate contains a large portion of latent heat, while air-cooled slag contains very little, this result also depending on rapid quenching.

Experiments made by the writer for the purpose of producing a material from furnace slag for use as a substitute for river or bank sand, for mortar and other purposes, without the necessity of a second operation of crushing or grinding, resulted in a granulate of greater weight and density than common granulate, finer and more uniform in size, with a well defined granular structure, and owing to the more rapid quenching, capable of producing a mortar of greater strength when combined with either cement or lime, because of its greater hydraulic energy. To this material I have applied the term "slag sand," in contradistinction to that of slag granulate as applied to the lighter and less hydraulic form. It is produced by projecting two jets of water under a pressure of 40 to 50 pounds per square inch, according to the size of the slag stream, in the line of the flowing molten slag. The jets now used are 10 inches wide and ⅛ of an inch thick; one being placed immediately below and on a line with the runner spout and the other above and at nearly a right angle to the first. The slag flows from the runner spout and falls on the lower jet of water, but does not penetrate it owing to the high pressure, while the velocity of the water causes the slag to draw into a thin sheet. The upper jet striking this sheet a few inches from the end of the runner spout, causes its thorough

disintegration and instant quenching, and it falls into the tank below.

The following comparative tests of river and slag sand, with various cements and lime, show the superior qualities of slag sand for mortar purposes.

TABLE IV.

TESTS MADE BY THE PITTSBURGH TESTING LABORATORY LIMITED.

All the Mortars contained three parts of sand to one part cementing material.

CEMENTS	SANDS	Tensile Strength Lbs. per Sq. In.			
		7 Days	14 Days	28 Days	3 Months
Portland	River	252	324	390	435
	Slag	278	375	484	594
Comparative	gain, lbs.	26	51	94	159
Comparative	gain, per cent.	10.3	15.8	24	36.5
Louisville	River	44	47	50	120
	Slag	59	61	63	145
Comparative	gain, lbs.	15	14	13	25
Comparative	gain, per cent.	34	30	26	21
Puzzuolani and Slag Cement	River	153	192	222	332
	Slag	174	271	295	479
Comparative	gain, lbs.	21	79	73	147
Comparative	gain, per cent.	15.7	41	32.5	44.3
Mason's Mortar	soft				
Lime	River	0	0	17	24
	Slag		90	131	163
Comparative	gain, lbs.			114	139
Comparative	gain, per cent.			771	580
Concrete Mortar	stiff				
Lime	River			34	47
	Slag		142	160	255
Comparative	gain, lbs.			126	208
Comparative	gain, per cent.			371	441

The tests show the following results:

First.—That Louisville cement with slag sand is 18 percent stronger at seven days than with river sand at 28 days.

Second.—That soft lime mortar with slag sand is 80 percent stronger at 14 days and 162 percent stronger at 28 days than Louisville cement with river sand at 28 days.

Third.—That stiff lime mortar is 184 percent stronger at 14 days and 220 percent stronger at 28 days than Louisville cement with river sand at 28 days.

Fourth.—That soft lime mortar with slag sand is 36 percent stronger and stiff lime mortar with slag sand is 112 percent stronger than Louisville cement and river sand at three months.

Common granulate with lime gives a tensile strength at 28 days of 60 pounds as soft mortar, and 90 pounds as stiff mortar. When common sand is used in mortar or concrete the strength is dependent wholly upon the adhesion of the cement. The sand is absolutely inert. When slag sand is used the sand contributes materially to the chemical reaction resulting in the cohesion of the materials. For the purpose of obtaining a more accurate comparison of the hydraulic qualities of slag granulate and slag sand, a quantity of each from the same furnace and cast was made into slag Pozzuolani cement with 15 percent of lime.

TABLE V.

Tensile Strength per square inch.

Slag Pozzuolani Cement, Neat			Gain per cent	½ Sand		Gain per cent
	Slag Granulate	Slag Sand		Slag Granulate	Slag Sand	
7 days	335	378	6.5	68	82	35.3
14 days	358	479	33.8	82	125	52.4
28 days	409	505	23.5	106	170	60.4
3 months	508	645	27.0	160	217	36.0
6 months	469	629	34.1	156	275	76.3
Average gain per cent			25.5			54.0

No effort was made to determine the quality of the lime used nor the best proportion for obtaining high absolute tests, but the comparison justifies the theory that rapid quenching improves the hydraulic quality of the slag.

TABLE VI.

ANALYSIS OF SLAG USED IN TABLE V.

	Gran. air cooled	Granulate	Sand
Silica	33.30	33.08	33.60
Alumina of Iron	14.78	14.80	14.32
Lime	50.22	50.10	50.25
Sulphur	1.48	1.41	1.10
	99.78	99.39	99.77
Sulphur as Sulphide		1.12	.88
Sulphur as Sulphate		.29	.22

While the granulate shows a loss of sulphur of .07 percent, the slag sand shows a loss of .33 percent or 25.7 percent of the total sulphur. Reference has been made to the setting of fine ground slag granulate under pressure and without addition of either lime or other chemical. Slag sand possesses this quality in a high degree without being ground, as is illustrated by the following practical application:

One to two inches of slag sand was used for the bedding of brick paving on foundation of six inches of broken stone and two to three inches of gravel. At the end of four and one-half weeks, a section of this paving was removed for the purpose of putting in water pipes, and it was found that the sand had set into a sheet of moderately strong concrete with the gravel adhering to the under surface. A piece of this about one foot square was obtained by the writer, and being kept damp has continued to harden. Owing to its sharpness, slag sand under pressure will not flow when either dry or supersaturated, and when set contributed materially to the stability of such paving.

Opposition on the Defensive.

The opposition encountered in Germany and France by the manufacturers of the various slag cements has resulted in the production of a very considerable literature on the general subject of slag utilization, and with the further result that the opposition has been placed upon the defensive. Unfortunately for us, the literature of slag is almost wholly in the German and French languages.

While the Portland cement industry had its inception and the early development in England, it is to Germany that we are indebted for its improvement in strength and reliability, and a thorough knowledge of its chemical action. That slag has been in use for more than 30 years in a country where cheapness is not a first consideration in engineering construction, but where ultimate economy is a necessity, and that it has made steady progress until it has been recognized by the best authorities as not only equal to the best material for particular structural uses, but as having no equal as a binding material in concrete and mortar, its use not only permitted but specified in important state, municipal and other engineering works, is a sufficient guarantee of its strength and stability to warrant the American engineer in encouraging its adoption here.

The probable effects of the sulphur contained in slag, when the latter is used in any of its forms in concrete-steel construction, is answered in "Notes from Report IX of Insurance Engineering Experiment Station, Boston, Mass." It follows: "The results of the test which were carried out under various conditions, lead to the conclusion that structural steel, if encased in a sound sheet of good concrete, is safe from corrosion for a very long period; longer than the changes in our cities will allow any building to remain. It is a necessity, however, to be sure that the steel is properly encased in concrete, and because of the difficulty in getting sound work, many engineers will not use concrete. This is especially true of cinder concrete in which the porous nature of the cinder has led to much dry concrete and many voids and much corrosion. There can be no question that concrete has rusted great quantities of steel, not because of its sulphur content, the danger from which is a myth, but because it was too dry. If cinder concrete be mixed wet, and well mixed, it may be trusted as much as stone concrete, so far as corrosion is concerned."

I hold that the same is true of slag concrete. Oxidation of the sulphur in the slag and consequent corrosion of the steel from that cause, cannot take place if the concrete is sufficiently sound to exclude the air. The converse of this proposition is true, that no matter what materials enter into concrete, if it is not made sufficiently sound to practically exclude the air, corrosion of the steel will inevitably result.

Experiments and developments in the utilization of slag have progressed along the same lines in the United States as in Europe, with the exception of brick making. The manufacture of slag wool was commenced by Henry D. Fabers in New Jersey about 25 years ago, and is now carried on commercially in a number of places. The Illinois Steel Co. has been making slag Pozzuolani cement since 1893 and it is now being made at Sparrows Point, Md., and at other places. The Illinois Steel Co. has also been making slag Portland cement since 1899, and its manufacture was carried on in a small way at the Clinton furnace in Pittsburg for several years, but has now been discontinued.

The only attempt to make slag bricks in this country of which I have knowledge, was by the Brier Hill Iron & Coal Co., at Youngstown, in 1902, when it erected an experimental plant and produced about 50,000. At Freeland, near Philadelphia, and at Reading, Pa., there are plants for crushing and sizing hard slag for concrete aggregate, roofing, etc. In the East, gravel for tar roofing has been almost wholly superseded by crushed slag, and it is being shipped from Philadelphia and Reading to Pittsburg, and at a cost for freight of more than $2 per ton. Carrying coals to Newcastle is a reasonable proposition compared with this.

As a rule limestone is to be preferred for aggregate in foundation retaining walls, etc., but in concrete floors and walls and other places where weight is an objection, and fireproof qualities desirable, crushed hard slag is much to be preferred.

If blast furnace slag was used for all purposes for which it is economical as being better adapted or cheaper than like materials now in use, the order of quantities used would be for the purposes as follows:

First.—As sand for concrete street paving, building block, rubble masonry.

Second.—In brick, for foundations, superstructure and refractory purposes.

Third.—As aggregate for concrete, roofing, etc.

Fourth.—In the manufacture of Portland cement.

Fifth.—In the manufacture of Pozzuolani cement.

Sixth.—In the manufacture of slag wool for non-conducting purposes.

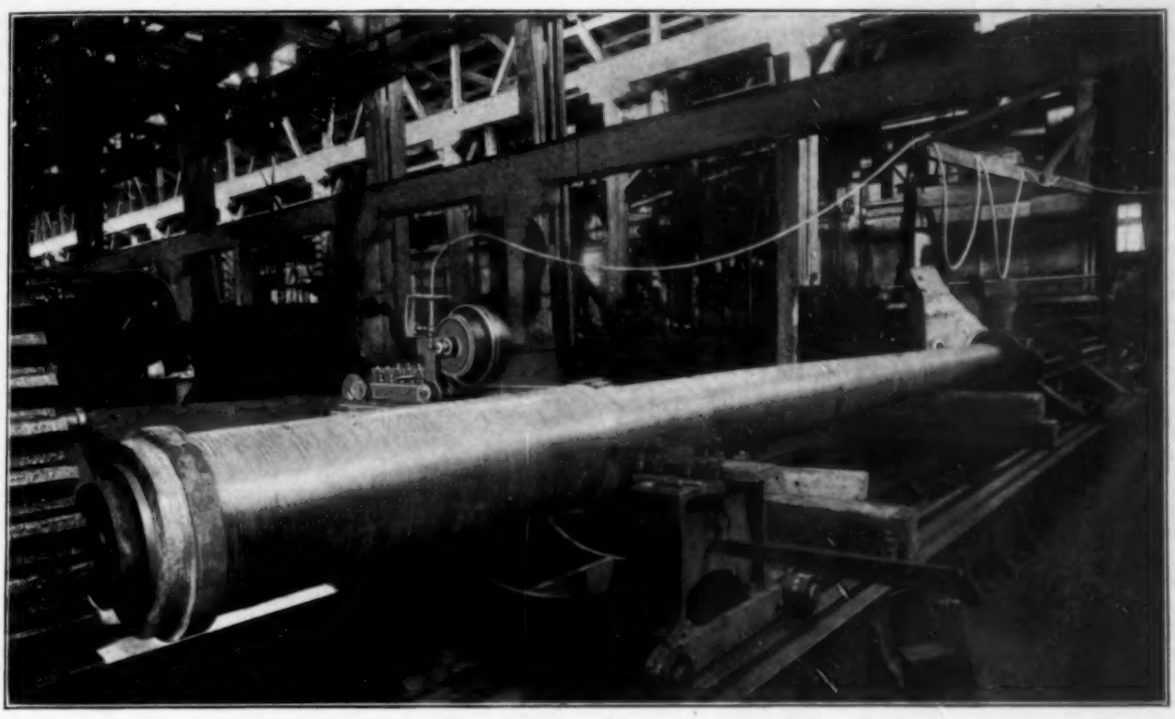
The value of the product for a unit of weight would be about in the reverse of this order.

The third annual meeting of the United States Steel Corporation will be held in Hoboken, N. J., April 18. The stockholders will elect eight directors who will hold office for eight years. The eight directors whose terms expire this year are: J. Pierpont Morgan, Henry H. Rogers, Elbert H. Gary, George W. Perkins, Charles M. Schwab, Henry Phipps, Edmund C. Converse and James Gayley. It is expected that they will be re-elected.

The United States Steel Corporation has donated $5,000 to the McKeesport, Pa., hospital. It has been the custom of the corporation to make an annual donation, but the amount just presented is unusually large.

THE BROWN WIRE-WOUND GUN.

Several wire-wound guns are at present under construction or test. These include the wire-wound ordnance of Vickers, Sons & Maxim, Ltd., of England, and the American guns projected by Major W. Crozier, chief of ordnance, U. S. A., and the weapon invented by J. Hamilton Brown. The necessity for making a piece of heavy ordnance of wire-wound tube construction is in the liability of cast or forged steel to embody flaws in large areas of metal. The weak place is not readily detected save by destructive tests of the material, whatever the radiograph investigation or some similar method may do for us in the future. The deficiency in fairly uniform material may be slight but a small defect in the desired homogeneity is a factor for serious consideration when dealing with the high pressures of modern artillery. The calculations of Col. John M. Ingalls for the six-inch gun here illustrated are based upon a safe pressure of 100,000 pounds to the square inch at the breech. This is not expected, of course, but is mentioned as showing the extreme strains contemplated by artillerists in comparison with the modest requirements of the shops generally.



THE MAKING OF A WIRE WOUND GUN.

The standard set by the makers and users of ordnance is admittedly close to the limit and the factor of safety is a small item in munitions of war. The loss of life on the Iowa by the blowing off of the breech of a 12-inch gun and the destruction later of other guns on the same battleship have had the effect of bringing forth an order which by reduction of charges diminishes the striking power of the navy from 7 to 24 percent, according to the figures given by Park Benjamin. This variation in the loss arises from the allowance made for age and pattern of the armament. The pressure at the breech around the explosion chamber and the possible droop of the barrel with the end strain of the heavy projectile in passing along the bore bring severe endwise and circumferential forces into play.

The work of J. H. Brown in the field of heavy gun construction is not of recent date. The first gun he invented was formed of bars having a cross section similar to a barrel stave. These were built up arch fashion to form a gun, but it was found that the limited thickness of the segments did not give any guarantee against flaws. The first attempt gave a practical gun but a broken segment was later developed. The gun shown is the latest design and is built under a Government appropriation of $41,000, to include also the mount and trial ammunition for the tests of the Board of Ordnance and

Fortifications. The gun is 6 inches bore, 313 inches long, weighs 20,000 pounds and is expected to have a possibility of safely sending a 100-pound projectile at a velocity of 3,500 feet per second. The photograph was taken at the plant of the Scott Iron Co., of Reading, Pa., and the gun is scheduled for finishing on May 1. The central tube is made of steel sheets with a lining, the combination tightly wound with wire. The steel sheets are 1-7-inch thick and are in the first instance 308 x 26 inches at the mill. The sheets are cut diagonally in two to form trapezoidal plates, 4½ inches at one end and 21½ inches wide at the other. These are bent to an involute curve and twenty-four sheets are assembled, the plates overlapping closely and regularly when clamped for the reception of the liner which is forced into place. The ends of the tube are temporarily plugged, then centered and the combination is mounted on the winding lathe. The 1-7-inch wire has square cross-section, is wound under a tension of 2,500 pounds and allowing 49 wires to the square inch brings a high degree of compression on the tube. The winding machine travels with the lathe carriage and has a drum mounted on slides at right angles to the axis of the gun. The wire passes around the drum which is hollow and is water cooled by the hose suspended above the lathe. The slides permit a slight yield at any increased strain on the wire and keep the tension uniform. The first wire is held by plugging the end (bent at right angles) into a hole and the coils are wound closely together by the side pressure of the tool held in the toolpost, the pressure forcing along the heavy carriage. The finishing ends of the wire are tightly wedged into place at the shoulders and the number of layers increases from 7 at the muzzle to 21 at the breech. A forged jacket is shrunk on the powder chamber for a distance of 12 feet at the breech and the rest of the gun is covered with a sheet steel jacket to give a finished appearance and protect the wires from injury by the enemy's shot.

Vickers, Sons & Maxim, Ltd.

The annual report of Vickers, Sons & Maxim, Ltd., of England, for the year 1903 shows a moderate increase in profits over the previous year. The statement shows earnings as follows: 1903, £651,121; 1902, £641,434; 1901, £696,332; 1900, £629,892. The report says that the Sheffield and Barrow works have done better than in 1902, though the company has suffered from want of orders, more especially in connection with field artillery—a condition which the directors state they regard as temporary. The report also states that the return from the various investments standing in the balance sheet as interests in subsidiary and connected companies has been on the whole satisfactory. The Wolseley Tool & Motor Car Co. and the holdings in Messrs. W. Beardmore & Co., the Chilworth Powder Co. and the Carlton Colliery Co. are stated to have all given a good return on the sums involved. It is further stated that the expectations with regard to the Wolseley Tool & Motor Car Co. have been fulfilled, and that there continues to be a large demand for the motor cars manufactured by them, while the recent Crystal Palace Exhibition is responsible for securing good orders.

Exchange Dealings in Pig Iron Warrants.

A meeting of pig iron selling firms and a committee from the New York Produce Exchange was held at the office of the American Pig Iron Storage Warrant Co., on March 24. Those in attendance were as follows: D. A. Dalton, of Dalton, Nash & Co.; W. W. Hearne and Mr. E. B. Blandy, of Matthew Addy & Co.; A. Fowler, of Rogers, Brown & Co.; H. H. Goodwin, of B. Nicoll & Co.; P. P. Williams, chairman, and Mr. Truesdell, secretary of a committee appointed by the New York Produce Exchange; Geo. A. Hull, president, F. A. Libbey, secretary and treasurer, and Geo. H. Hull Jr., agent, American Pig Iron Storage Warrant Co. F. A. Dalton presided and Geo. A. Hull Jr. was made secretary. Concerning the results of the canvass recently made by the Warrant company to ascertain what furnaces favored the movement to establish a market for daily exchange dealings in pig iron warrants, Mr. Hull stated that the response had demonstrated that more than one-half the merchant furnace capacity of the country was represented by the signatures of officers and governors of furnace companies as being favorably disposed toward the movement. Mr. Williams stated that the Exchange was in hearty accord with the movement, its object being to increase the Exchange membership and develop an active trading in pig iron warrants through the iron houses to be represented on the floor.

After a general discussion in which were brought out the policy and methods of the Produce Exchange as well as the general features of the warrant system, Geo. H. Hull Jr. was appointed to secure the consent of a number of iron houses to take memberships on the Produce Exchange and to report at a subsequent meeting.

Screw Stocks Consolidated.

After negotiations covering an extended period, the Illinois Screw Co., of 40 S. Canal street, Chicago, has consolidated its Chicago store with that of The Chicago Screw Co., at 2 N. Canal street. These companies, for some time past, have been working in harmony and the concentration of the stock of screws formerly carried by each concern will result, it is believed, in the largest stock of screws carried anywhere in the United States, and enable the company to fill any but the largest orders from stock. No change will be made as yet in the Illinois Screw Co.'s factory at Chicago Heights. O. L. Bicknell, formerly secretary and treasurer of the Illinois Screw Co., will be manager of the combined store, and Messrs. Barry, Nelson and Holst will continue to represent their respective concerns with the trade as heretofore.

The fourth annual sessions of the summer school for artisans held under the direction of the College of Engineering of the University of Wisconsin at Madison, Wis., begins June 27 and continues for six weeks. Courses of study are offered in steam, gas and other heat engines, in applied electricity, in mechanical drawing and machine design, in materials of construction, fuels and lubricants, in wood and metal working machinery, and in blacksmithing and patternmaking. The instructors are from the regular faculty of the College of Engineering and the entire laboratory and shop equipment belonging to the college is used by the students in the summer school. The requirements for admission do not extend beyond a working knowledge of English and arithmetic.

American members of the British Iron and Steel Institute, resident of Pittsburg and vicinity, held a meeting at the Union Club, Pittsburg, on Friday, March 18, for the purpose of forming an organization and electing a reception committee to welcome the visiting members of the institute and their ladies, during their stay in Pittsburg. Julian Kennedy was elected permanent chairman and James M. Camp secretary. At a future meeting the reception committee will be elected. The visit of the institute to Pittsburg will be on Oct. 29, 30 and 31.

Application has been made for the appointment of a receiver for the Defiance Tool Co., Defiance, O. The concern was formerly located at Shelby, O., and moved to Defiance about ten months ago, occupying a building owned by the Pawtucket Institution for Savings, Pawtucket, R. I. The application for receiver was made by attorneys for the savings institution.

The directors of the Fort Wayne Iron & Steel Co., Fort Wayne, Ind., have elected W. J. Vesey, C. H. Rawlins and James McKay to fill the vacancies created by the retirement of the Chicago members of the board who ceased to be stockholders and tendered their resignations. C. A. Rawlins was elected vice president in place of J. W. Moody, resigned.

The monthly meeting of the American Society of Mechanical Engineers was held at the Society house on March 29. Julian Kennedy, of Pittsburg, was announced as the speaker; his subject was "How Steel Rails are Made." The address had the following divisions: steel, iron, carbon, oxygen, and their action on each other; assembling raw material; the blast furnace; the Bessemer converter and the rolling mill.

Exact Time Study as the Basis of Pay for Work Done.*

BY H. L. GANTT.

Most manufacturers are perfectly willing to pay extra high wages if by doing so they can get the full output of their plants. Many do pay high wages, yet only a few get even approximately as much work done as should be done; and the problem before us all is to find out why we cannot buy the necessary amount of labor if we are willing to pay full price for it.

Before going any deeper into this let us suppose we are trying to buy a fast horse, at the same time supposing that we have never made any special study of horses. It is safe to say that if we get the full value of our money it will be by good luck rather than anything else. Again, supposing that we are trying to buy something with which we are not familiar, is it not a fact that we are very unlikely to get our money's worth?

Our experience proves this to be the case with material things; is it strange that the same thing should be true about labor? The reason we so seldom get the full value of our money when we attempt to buy labor is because we don't know enough about what we are buying.

Buying labor is one of the most important operations in modern manufacturing, yet it is one that is given the least amount of study. Most shops have expert financiers, expert designers, expert salesmen and expert purchasing agents—experts for everything except labor. The buying of labor is usually left to people whose special work is something else, with the result that it is usually done in a manner that is very unsatisfactory to buyer and seller. It is admitted to be the hardest problem we have to face in manufacturing today, and yet it is only considered when the manager "has time" or has "to take time," or on account of "labor trouble." The time to study this subject is not when labor trouble is brewing, but when things are running smoothly and employer and workman have confidence in each other.

The Price of Labor.

Men as a whole (not mechanics only) prefer to sell their time rather than their labor, and to perform in that time the amount of labor they consider proper for the pay received. In other words, they prefer to work by the day and be themselves the judges of the amount of work they shall do in that day, thus fixing absolutely the price of labor without regard to the wishes of the employer who pays the bill.

While men prefer as a rule to sell their time and themselves determine the amount of work they will do in that time, a very large number of them are willing to do any reasonable amount of work the employer may specify in that time, provided only they are shown how it can be done and paid substantial additional amounts of money for doing it. The additional amount needed to make men do as much as they can depends upon how hard or disagreeable the work is and varies from 20 to 100 percent of their day rate.

If the work is light and the workman is not physically tired at the end of the day he will follow instructions and do all the work called for if he can earn from 20 to 30 percent in addition to the usual day's wages. If the work is severe and he is physically tired at the end of the day he requires from 40 to 60 percent additional to make him do his work. If in addition to being physically tired he has been obliged to work under disagreeable conditions or in intense heat, he may require 60 percent or even 100 percent additional. As examples of the three kinds I may cite the following:

Light work—Inspecting, counting, handling light objects, etc.

Heavy work—Running machine tools, handling pig iron, shoveling, etc.

Heavy and disagreeable work—Smith or hammer work, work around furnaces, in gas house, rolling mills, etc.

These facts are derived from experience and give us a key to the intelligent purchase of labor. For instance, if we wish to buy the amount of labor needed to accomplish a certain task, we must first find out exactly and in detail the best method of doing the work, and then how many hours' labor of a man suited to the task working at his best normal rate and by the methods prescribed are needed to perform it.

This is simply getting up a set of specifications for the labor we wish to buy, and is directly comparable to a set of specifications for a machine or a machine tool. The man who buys the latter without specifications is often disappointed even though the manufacturer may have tried earnestly to anticipate his wishes; and the man who buys the latter under the same conditions has in the past almost universally found that a revision of his contract price was necessary in a short time. The relative importance of buying labor and machinery according to best knowledge we can get, and the best specifications we can devise, is best illustrated by the fact that while the purchase price of a machine may be changed whenever a new one is bought, that of the labor needed to do a piece of work should be practically permanent when it is once fixed.

Knowing exactly the work to be done and the conditions under which labor is for sale, the purchase price of the proper amount of labor is simply a financial transaction, and it is comparatively of little importance whether the transaction takes the form of day work, piece work, differential piece work, or task work with a bonus.

In fact, each of these different forms of contract seems to have its special place. The significance of the terms "differential piece work" and "task work with a bonus," however, is that they cannot be applied without a clear knowledge of the labor that is to be bought. In order to get this knowledge a very large amount of careful study must be given to the details of each problem by men who are trained to the work. Until a man has had a large amount of practical experience in this study his results are always inaccurate.

Time and Labor.

It is a pretty easy job to keep a record of how many tons of pig iron an ordinary laborer will load into a freight car per day when paid by the day for his labor, but it is not an easy task to find out how many a good man suited to the job can load. This problem has been solved and the ratio is about 1 to 3½. The same ratio holds good for shoveling coal, sand, gravel, etc. These facts were found out by a detailed study of the labor needed and have been confirmed by experienc.

Detailed Study of Labor. To explain what is meant by a detailed study of labor we will suppose we are studying he art of shoveling. The conditions that enter into the problem are: Size of shovel, time to fill shovel, time to empty shovel, time needed for rest.

Size of Shovel. The shovel should hold the full weight a good strong laborer can throw conveniently. This has been determined and in any kind of shoveling the size of the shovel should be such as will hold the proper weight of the material handled.

Time to Empty Shovel. Time to empty shovel does not vary the material and the conditions under which the shovel is filled. The easiest conditions under which a shovel can be filled are from the base of a pile of material resting on a hard floor. If the material is fine and homogeneous it is but little more difficult, and hence takes but little more time to fill the shovel if the workman is on top of the pile; but if the material is irregular or lumpy, like coal, or packs tightly, like broken stone, the difference in time between shoveling from the top or bottom of the pile is very great.

Time to Empty Shovel. Time to empty shovel does not vary so much except in the case of materials that stick to it. The time, however, needed to make a long or high throw and bring the shovel back to the proper position for filling is substantially greater than that needed if the throw is a small one.

Rest. If a man fills and empties his shovel continuously without losing any time between operations he will need to stop occasionally for rest. It is a question to determine what proportion of the time a good man suited to the work needs for rest. Having determined the time needed to fill and empty a shovel under any set of conditions we can figure how many shovelfuls he can throw per minute, and knowing the weight his shovel will hold we can find the weight he can shovel per minute. To keep this up we must allow him the proper proportion of time for rest; and making the proper allowance, we can calculate what he should do per hour.

*Read at the Philadelphia meeting of the National Metal Trades Association, March 24, 1904.

Accuracy of Results. When proper study of this character has been made the results of this method of fixing pay for work done are absolutely reliable. It must be borne in mind, however, that the rates are not made to suit the average man but only a man suited to the job. In fixing the pay for this work we may make a piece rate which will enable a good man to make 50 percent in addition to his day's rate if he does the amount of work indicated; or we may indicate the proper amount to be done in a day and give him a bonus of 50 percent if he does all, a smaller bonus if he does a definite fraction of it, and his day's rate only if he falls below that fraction. This in outline is the method of handling an ordinary labor problem.

A machine shop problem is of a different nature and involves a number of other elements, which complicate it very much, and make its solution much more difficult; but the advantages to be gained from its solution are so great that thousands of dollars have been spent on the work and results obtained that are worth many times what they cost.

The Machine Shop.

There are many ways of handling a machine operation, but I will cite only the two extreme cases with which I am familiar:

1. The foreman gives it to the first available man who has a machine capable of doing it, with but little consideration as to whether it can be done economically on that machine or not. He gives few, if any, instructions and the workman sets out to hunt up holding devices such as he thinks proper for the work. Having secured these he sets the work carefully and slowly and then takes up the question of cutting tools, which certainly need to be ground and frequently to be forged. Having secured a good tool, which he does not wish to spoil, he starts his machine at a good steady speed and a small feed. A large feed would certainly make his belt slip and might spoil his tool and his education has taught him not to take chances. He gets the job done in the long run and it is usually well done.

2. The other extreme is where the work is given to the best expert machinist available, who has at hand slide rules embodying the laws of cutting metals and their application to each of the machine tools in the shop. Knowing approximately the properties of the metal to be cut, he can determine in a few minutes the most economical combination of feed and speed for doing the work on the available tools and hence the time needed for doing it. From previous study of the details of setting work he can determine which of the various methods of setting or holding the work is most economical. Having satisfied himself on these points he makes out a detailed set of instructions for setting the work and for doing each of the machine operations, giving the shape of tool, kind of tool steel, combination of cut feed and speed for each, with the time needed for each and the total time for the job.

The piece to be operated upon and all the appliances needed are gotten to the machine while it is still running on the previous job, so that no more time may be lost than is needed to change the work in the machine. The workman is given a substantial bonus in addition to his day's wages, amounting to from 30 percent to 50 percent of his day's wage if he does the work in the time set, but only his day's rate if he takes more than the time allowed.

The result of this is that in a very short time most of the workmen are glad to give up their old haphazard methods and follow instructions in order to get the increase of pay. The ratio of the time taken to do the same piece of work under the two sets of conditions I have described is seldom less than 5 to 1.

I have, of course, taken extreme cases and there are all degrees of day work, premium and piece work between the two, but even under the best forms of premium and old fashioned piece work the time needed is usually at least double that needed if a thorough knowledge of the laws of cutting metals is brought to bear on the subject.

Difficulty of the Problem.

The proposition in itself, as I have stated it, seems simple and many will ask what is the difficulty in carrying it out. I answer without hesitation, a little knowledge. F. W. Taylor, who was the pioneer in this work, has been at it for twenty years and I have been at it for fifteen years, yet the man who has given the subject two hours' study is as a rule fully prepared to improve on the methods that have been developed. His improvements invariably consist in trying some short method that to him looks promising, and which I can assure you looked the same way to us several years ago. Many blind leads were followed, and short cuts taken before it was clearly established that such methods did not pay, for they gave results that were always short of the maximum, and we never knew how much short they were until a complete investigation often showed that they were less than 50 percent of that maximum.

The results of the substitution of this type of management, in which all work is done by the best method that the experts can devise and at the best speed a man fitted for it can work, for the ordinary one when the method of doing the work is decided by the workman, or at best by a busy foreman, is that the output of many plants is doubled and that of others increased in a higher ratio.

Practical Points for Manufacturers.

The conclusions to be drawn from the above facts are:

1. Don't increase the size of your plant to get an increased output until you have made a scientific study of the capacity of the plant you have.

2. The profit to be derived from increasing the output of your present plant is so much greater than that to be obtained from getting the same increase of output from a larger plant that no possible means of getting it from your present plant should be left untried.

3. While doubling the size of your plant seldom doubles your output, unless you very materially modify your methods of management, and never more than doubles your profits, the expenditure of one-third of the money needed to do this in installing a thoroughly scientific system of management with modern equipment in your plant will almost surely more than double its output and increase your profits 200 percent.

4. The art of scientific management is so new that few people know its possibilities. The policy of most plants is controlled by a man who has had his main experience in one of these departments—engineering, financial, practical shop work—and the department he is most familiar with is the one he considers most important.

The superintendent, who was formerly the engineer, usually has the engineering portion of his plant in good shape, often at the expense of the financial and operating departments. In the same way a financier who has become the manager is apt not to appreciate to their full value the engineering or operating details. The shop man, who often at the age of 40 becomes superintendent, is seldom able to organize the engineering on a proper scientific basis, although he usually succeeds in getting good work done, and almost never succeeds in assigning to the financial end its proper weight.

In fact, if a half-dozen of the best managers in this room were called upon to decide upon the best policy throughout for a plant, there is but little doubt that there would be more differences of opinion. Such men are all successful and hence must in a more or less degree be logical, and should draw the same conclusion from the same facts. Inasmuch as they apparently do not, the natural supposition is that they do not see the facts in the same light; in other words, the facts as a rule are not clear.

The first object of the work advocated is to find out exactly what the facts are by the only safe method known, that of scientific investigation. Having done this and put them in such a shape that they cannot be misunderstood, the conclusions to be drawn will vary but little the one from the other, and competent managers will be in substantial accord as to the policy to be pursued.

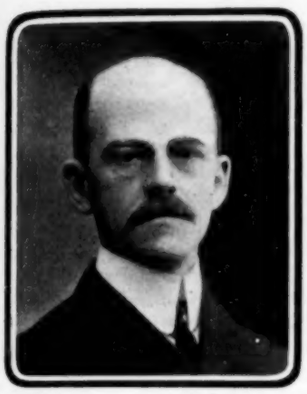
The Standard Pulley Co., 524-526 East Fifth street, Cincinnati, O., recently incorporated, will manufacture cast iron pulleys exclusively. The foundry has a complete equipment for the manufacture of castings and finished pulleys. The daily capacity is about 10 tons. The company believes that by devoting its entire capacity to one kind of output it will approach nearer perfection than can a general foundry on the same output. Although the plant has been operating but two weeks it has been turning out a light, but strong, perfectly balanced, soft iron casting that has been very favorably received.

Officers of the N. M. T. A.

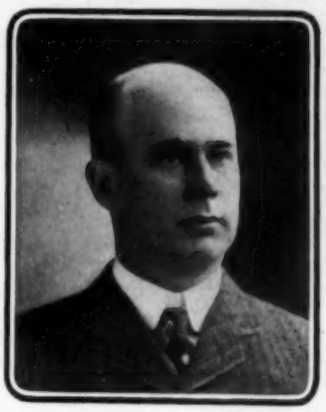
The election of officers of the National Metal Trades Association at the concluding session of the convention at Philadelphia last week resulted in three changes in positions on the executive staff, though only one change in personnel. W. D. Sayle, of Cleveland, is the new member, being elected second vice president. H. N. Covell, who was elected first vice president last year, and who later became acting president on the resignation of S. W. Watkins, is now president. J. W. Gardner, who was second vice president last year, is the new first vice president.

President Covell is superintendent in charge of the works of the Lidgerwood Mfg. Co., Brooklyn, N. Y. He was born in Troy, N. Y., in 1862, and is a graduate of the Sheffield Scientific School of Yale University. He was engaged with the Yale & Towne Mfg. Co. from 1884 to 1889, learning the trade of machinist and having experience in various departments of that company's works. He became connected with the Lidgerwood Mfg. Co. in 1889. Mr. Covell was one of the founders of the National Metal Trades Association and has been active in its councils from the beginning.

Vice President Gardner, like President Covell, served an apprenticeship in the machine shop, beginning at the age of 17.



H. N. Covell, President.



J. W. Gardner, 1st Vice President.

W. D. Sayle, 2d Vice President.

F. A. Geier, Treasurer.

E. F. DuBrul, Commissioner.

Robert Wuest, Secretary.

He is manager of the Gardner Governor Co., of Quincy, Ill.

W. D. Sayle, the second vice president, was born in Cleveland in 1860. He began his business career as bookkeeper for the Ohio Building Co., of that city. Later he became connected with the East End Banking & Trust Co., and is secretary of the company in charge of its St. Clair street branch. He became connected with the Cleveland Punch & Shear Works Co. in 1890 and is president of the company. He has an important interest also in the Cleveland Crane & Car Co., of Wickliffe, O. Mr. Sayle is president of the Cleveland Manufacturers' Association and a member of the administrative council of the National Founders' Association.

The career of Fred A. Geier, Cincinnati, re-elected treasurer of the association, has already been given in detail in these columns. He is one of the most successful of Cincinnati machine tool manufacturers and has been an important factor in the success of the Cincinnati Milling Machine Co.

Commissioner Du Brul and Secretary Wuest are gifted in their respective lines of effort for the association. It has gained in prestige and membership under their administration of its affairs, and the Philadelphia convention gave proof in more than one way of the satisfaction of the association with their work. Both were re-appointed at the meeting of the administrative council held after the adjournment of the convention.

American Bridge Company Removal.

The Eastern and Pittsburg divisions of the American Bridge Co. have been abolished and the plants embraced in them have been placed in charge of R. J. Davis as operating manager with headquarters in the Frick building, Pittsburg. On March 26, President Alfred J. Major, together with the assistant to the president and the operating manager, removed to Pittsburg from Philadelphia, the offices also being in the Frick building. On March 31 the auditing department of the company arrived in Pittsburg and on April 9 the treasury department will be removed to Pittsburg. On March 26 the office of the chief engineer of the American Bridge Co. of New York was removed to Pittsburg and on March 31 the auditing department of that company was removed to the same place. On April 9 the treasury department will be removed to Pittsburg from New York. The offices of the president and the secretary will remain at 100 Broadway, New York.

The Whyel Coke Co., of Uniontown, Pa., has been incorporated with $50,000 capital. The company has been operating coke ovens for some time. Harry, George and John Whyel are the incorporators.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The White Engineering Co., Marion, O., has been incorporated with a capital of $25,000, to manufacture valve gear, portable air engines, etc. Incorporators are: Henry and John White, H. J. Cobbold, J. F. McNeal and L. B. McNeal.

The Schmidtke & May Co., Sturgeon Bay, Wis., has been incorporated with a capital of $20,000 to manufacture machinery.

The Latchford Machine Co., Chicago, has been incorporated with a capital of $50,000 to manufacture machinery. Incorporators are: Joseph M. Griffin, Warren Nichols, Harry A. Warren.

The Train Order Protector & Signal Lock Co., Nashville, Tenn., with an authorized capital stock of $100,000, has been incorporated by F. E. Draper, E. H. Roy, F. H. Benjamin, J. H. Roberts, T. J. Vallen, E. C. Kleeman and A. E. Howell. The company proposes to manufacture machines for the protection of train orders and signal locks, the invention of Mr. E. H. Roy.

The Faribault Mfg. Co., Faribault, Minn., has been incorporated with a capital of $50,000 to manufacture machinery.

The Quintard Iron Works Co., New York City, has been incorporated with a capital of $250,000. Directors are: N. F. Palmer, G. Q. Palmer and F. F. Palmer, all of New York.

Isaac M. Hutchinson has been elected president and Pablo Martinez del Rio vice president of the Mexican Car & Foundry Co., organized in Mexico City, Mexico, with a capital of $1,000,000. The company owns 71 acres of land three miles from Mexico City and has begun the erection of a plant.

The Acme Foundry Co., Brooklyn, N. Y., has been incorporated with a capital of $40,000. Directors are: J. L. White and John Warren, Brooklyn, and J. B. Davie, New York.

The Holland Machine Co., New York, has been incorporated with a capital of $25,000. Directors are: H. R. Marcellus, Brooklyn; N. W. Walton, Newark; and W. W. Mumford, New York.

The Power Plant Specialty Co., Chicago, has been incorporated with a capital of $20,000 to manufacture and install engines and machinery.

R. K. Papin, 402 North Fourth St., St. Louis, Mo., wants to buy for cash shay-geared locomotive, either standard or narrow gauge, for logging road.

Board of Water Commissioners, Norfolk, Va., will open bids April 8 for furnishing and laying 30-inch pipe line. Materials to include cast-iron piping, gate valves, special castings, etc.

M. Solmson & Co., 1616 West North avenue, Baltimore, Md., are in the market for 50-h. p. steam engine.

Meridian Fertilizer Co., Meridian, Miss., wants prices on boilers, engines, air compressor, sheet lead, rock crusher, conveying machinery, etc.

Nelson-Bethel Clothing Co., Louisville, Ky., is in need of second-hand engine and boiler of 50-h. p., constructed so as to use the exhaust for heating building; also needs generator for lighting purposes and to furnish current for air motor of 20 h. p.; dynamo to be as large as 50-h. p. engine can accommodate.

Barataria Canning Co., Biloxi, Miss., is in market for boiler 16 feet long, 5 feet in diameter and 44 4-inch tubes, working pressure of 120 pounds.

R. P. Johnston, Capt. Engineers, Post Office building, Wilmington, N. C., wants prices on a five-ton traveling crane, operated by hand, to span a cable tank 20 feet in width and 45 feet in length.

Board of Public Works, John T. Ahearn, Supt., will receive bids until March 19 for furnishing f. o. b. cars, Nashville, Tenn., one 300-h. p. Otis tubular feed water heater and purifier, the inlet and outlet to be tapped for 2½-inch pipe. Usual rights reserved.

Stanton Foundry & Machine Co., Palatka, Fla., wants prices on roofing, siding, bar iron, iron pipe, etc.

The manufacture of an automatic spring motor sewing machine will be undertaken by a company now being organized in Grand Rapids, Mich. The motor is the invention of Robert E. Grant, and the patents are held by him and James Oppenneer.

Ornamental Pipe & Wire Co., Portsmouth, Va., wants ¾-inch, 1-inch, 1½-inch second-hand pipe.

The Reading Machine Screw Co., Reading, Pa., has been incorporated with a capital of $200,000 to manufacture steel, iron, etc.

The Champion Steel Range Co., Cleveland, has been incorporated with a capital of $100,000. Incorporators are: C. H. Miller, F. P. Wood, John A. Herbst, Carl Miller Jr. and Frank S. Alber.

The Perfection Wire Tool & Novelty Co., Langston, Okla., has been incorporated with a capital of $5,000. Incorporators are: Charles Stoolfire, W. J. Jackson and A. J. Alston.

The Colonial Scale Co., St. Louis, Mo., has been incorporated with a capital of $25,000 to manufacture and deal in coin-controlled machines. Incorporators are: Robert M. Mays, Frank L. Roop and G. W. Fryhofer.

The Atlantic Machine Works, Westminister, Md., have been incorporated with a capital of $15,000. The officers are: E. Oliver Grimes, president; William H. Leiser, vice president; Franklin M. Beggs, secretary, and Howard Schaffer, treasurer. The company has a plant established and is manufacturing the Leister can and shade-roller labelers.

The Fallow Draft Gear Co., Baltimore, Md., has been incorporated with a capital of $250,000. Incorporators are: J. Edward Harvey, Dwight F. Mallory, 430 W. Cross street, John H. Farlow, 714 N. Fulton avenue, and others.

The Thomas Furnace Co., Milwaukee, has been incorporated with a capital of $150,000. Incorporators are: John M. Thomas, Lewis M. Ogden, and Fordyce H. Bottum.

A company has been organized at Dallas, Tex., to manufacture sheet metal. The capital will be $25,000 and the officers will be E. H. Conibear, president; Vernon Jones, vice president; and Millet Story, secretary and treasurer. The company has an office at 243 Young street.

The Hudson Tool Co., Los Angeles, Cal., has been incorporated with a capital of $200,000. The directors are: W. E. Smythe, Harriet B. Smythe, San Diego; Lillian C. Hudson and E. T. Dunning, Los Angeles.

The Holland Development Co., New York, has been incorporated with a capital of $30,000, to manufacture tools, machinery, etc. Directors are: M. E. Gates Jr., New York; A. B. Triggs, Brooklyn; and V. Lindsley, New York.

The C. S. Buell Co., Brooklyn, N. Y., has been incorporated with a capital of $25,000 to manufacture sheet metal.

The Kiler Motor Mfg. Co., Indianapolis, Ind., has been incorporated with a capital of $25,000. Incorporators are: Ed. N. Hill, Charles M. Kiler, H. O. Winter, W. B. Hill and E. J.

The Emergency Car Brake Co., Cumberland, Md., has been incorporated with a capital of $50,000, to manufacture car brakes and car fittings. Incorporators are: Henry Fresh, Conrad G. Smith, Henry A. Hensey, James W. Thomas, of Cumberland, and Asa F. Speicher, of Somerset, Pa.

The Indestructible Post Co. has been incorporated with a capital of $200,000, to manufacture steel fence posts with cement foundation. It takes over the fence post department of the Inland Steel Co., of Chicago. The general office is 716 First National Bank building, Chicago.

The Orange Iron Works, Orange, Texas, will erect a foundry and machine shop at Alexandria, La., to cost about $30,000. They will be in the market for new equipment as soon as the plans are prepared.

Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until April 26, for the construction, including heating apparatus, electric conduits, and wiring, of the United States Post Office at Logansport, Ind., in accordance with the drawings and specifications, copies of which may be had at the office of the Supervising Architect or the office of the Postmaster, Logansport, Ind.

The United States Malleable Iron Co., Toledo, O., which is erecting large additions to its plant, has sent out the following list of machines that it will require, orders for which it will place in about two months: One shaper, 26-inch stroke, 26-inch cross travel; one engine lathe, 9-inch radius swing, 6-foot bed, with one four-jaw chuck, 9 inches diameter, one

two-jaw chuck, 9 inches diameter, one two-jaw chuck, 12 inches long, 4½ inches wide, 2½-inch jaw, one chuck for drills 0 to 1 inch; one drill press, 20-inch swing, 16-inch table, hand feed, with one chuck for 0 to 1 inch drill; one speed lathe, 10 or 12-inch hollow spindles, 8-inch radius swing, with slide rest; one chuck, 0 to 1 inch drill; one three-jaw chuck, 6 inches diameter; one milling machine for slotting metal patterns; one band saw, 36 inches, with three saws, ½, ¾ and 2 inches; one 16-inch jointer; one 20-inch emery water wheel; one ⅝-inch bench emery dry wheel stand, with two 8-inch wheels, one with round edge; one hand trimmer, 16 inches over all; one sheet metal shears, 12-inch cut; one 60-h. p. engine, with ⅓-cut off, 90-lb. steam pressure slide valve, high speed automatic and compound automatic; one 100-h. p. boiler for 130 pounds steam pressure. The company will require a guarantee as to the efficiency of boiler and engine, and the quantity of coal required to operate them.

Fires and Accidents:—

During a flood which inundated a large part of Beloit, Wis., March 22, John Thompson & Sons' gas engine shops in South Beloit were burned. Loss $60,000.

The main foundry building of the Tacony Iron Works, Philadelphia, was destroyed by fire March 23, causing a loss of $50.000. Many valuable patterns were destroyed.

The car department of the Santa Fe railroad shops at Albuquerque, N. M., was destroyed by fire March 19. About 100 men were thrown out of employment.

At East Chicago, March 26, lightning set fire to the rolling mill plant of the Republic Steel & Iron Co., causing a loss of several thousand dollars.

A number of industrial plants at Lansing, Mich., suffered severely on account of the flood last week. Gasoline floating down the water from a leaking tank ran into the boiler fires at Gates & Edmond's gas engine plant, resulting in a fire which destroyed the buildings. Other concerns were damaged by water.

A number of manufacturing concerns of Indiana Harbor, Ind., were damaged by the flood last week. Among those which sustained considerable loss was the Standard Forging Co.

The J. H. Dawson Machinery Co., manufacturer of iron and brass working machinery, 39-41 South Canal street, Chicago, informs us that its loss from the recent fire in its plant was slight, being confined entirely to damage done by water. The fire loss was to another tenant and was not large.

New Construction:—

Contracts involving about $300,000 have recently been taken by the Riter-Conley Mfg. Co., of Pittsburg. About 1,000 tons of steel will be consumed in an addition to the plant of the West Virginia Pulp & Paper Co., at Piedmont, W. Va. The Riter-Conley company also secured the contract for the addition to the forge shop of the Midvale Steel Co., Philadelphia, made necessary by the company's contract to furnish armor plate for the United States navy. This contract requires about 2,000 tons of steel at a cost of about $160,000. The frame work is made unusually heavy because of the fact that it will carry traveling cranes of a capacity of 150 tons.

Thomas C. Basshor Co., engineer, contractor and dealer in machine supplies, 220 West Pratt street, Baltimore, will erect a new structure at 28 Light street, to replace building destroyed by fire. The new plant will be three or four stories high, 25 x 166 ft. Full machine shop equipment will be installed.

Thomas B. Weston, manufacturer of edge tools, 735 East Pratt street, Baltimore, is preparing to erect a new plant at 205 McElderry's wharf. The structure will be two stories.

The Stanton Foundry & Machine Co, Palatka, Fla., recently incorporated, has been consolidated with the Palatka Iron & Brass Foundry. The company has a site fronting 300 ft. on the river which will be used in building extensions to the works.

The White-Blakeslee Mfg. Co., Birmingham, Ala., will rebuild the plant recently burned at a loss of $10,000. The building will be of brick, 72 x 128 ft., with a 32-foot span in the center for electric crane. New machinery will be installed.

F. Arnold & Sons, 310 North Eutaw street, Baltimore, dealers in and manufacturers of surgical instruments, will remodel their plant. An addition will be erected, metal ceilings will be used and machinery for manufacturing and repairing surgical instruments will be installed.

The Henry Equipment Co., Denver, Colo., will erect a plant in that city for the manufacture of equipment for the lighting of railroad cars by electricity generated from the axles. This system of lighting has been in use on the Chicago & Alton for over a year and is said to give satisfaction. A small plant at Milwaukee has been supplying the demand so far. It is expected that the new plant at Denver will cost about $200,000 and that 300 men will be employed. The officers of the company are: President, C. F. Elliott, formerly traffic manager of the Florence & Cripple Creek road; vice president, G. S. Wood; secretary, William Barbor; treasurer, Governor James H. Peabody. D. Carl Henry, son of the inventor of this system of lighting, is the chief engineer.

The rebuilding of the portion of the Malleable Iron Works, Lancaster, Pa., destroyed by fire a few months ago has been somewhat delayed by the weather, but it is now being pushed forward rapidly.

The Chattanooga Roofing & Foundry Co., Chattanooga, Tenn., has begun the erection of another addition to its plant. The new building is a two-story stone and brick, 50 x 120 ft., and will be used as a pattern and wrought iron department. The structure will cost $5,000 and considerable new machinery will be installed. This is the second building erected by the company within twelve months. The other building was of brick, 50 x 100 ft., two stories.

The Caldwell & Drake Iron Works, Indianapolis, Ind., expect to build an addition in the near future, but plans have not yet been made.

The contract for building a power house for the eastern section of the Pennsylvania, New York & Long Island railroad has been awarded to Milliken Bros., of New York. About 2,500 tons of structural steel will be used.

The Chicago, Burlington & Quincy railroad has placed an order for the building of a bridge requiring 800 tons of steel, and the New York, New Haven & Hartford Railroad Co. is in the market for about 1,200 tons of structural steel for bridge construction.

The Cleveland Foundry Co., Cleveland, has awarded the contract for a two-story brick building, 50 x 90 ft., which will be used as a finishing department.

On account of increasing business, the James A. Spargo Wire Co., Rome, N. Y., has found it necessary to increase its manufacturing capacity by the addition of a two-story brick building.

The Central Machine Co., Niagara Falls, N. Y., will erect a plant two stories, 60 x 120 ft., at a cost of about $10,000.

The Garwood Foundry & Machine Co., Garwood, N. J., is building a foundry at a cost of about $10,000.

The Murray Co., Dallas, Tex., manufacturer of cotton gin machinery and supplies, is planning to make extensive additions to its plant.. The new structures contemplated are a foundry, machine shops, tin shop, power house and office building. A considerable purchase of new machinery will be made.

Ground has been broken and contracts let for a 75-ft. addition to the new machine shop of the Hyatt Roller Bearing Co., Harrison, N. J. The plant was completed only six months ago, but the demand for Hyatt bearings has made it necessary to erect the new addition, which will be of brick, two stories. The ground floor will be fitted with modern heavy machine tools, while the second floor will be used exclusively for assembling automobile bearings. The building will be completed by May 15.

W. E. Lloyd, general manager of the Muskingum Valley Sheet Steel Co., Zanesville, O., has announced that a fourth mill will be added to the capacity of the plant.

The Rock Island and Frisco railroads will build a union depot at a cost of about $150,000, at Oklahoma City, O. T. It is expected that both roads will, in the near future, establish shops at Oklahoma City.

The Liberty Supply Co., Waynesboro, Pa., will build a foundry and machine shop. The main building will be 60 x 360 ft.

The Delaware, Lackawanna & Western railroad has pre-

pared plans for the construction of a steel and iron freight house at Buffalo, at an approximate cost of $100,000. The structure will be 70 x 500 ft., two stories in height, equipped with electric elevators and modern in all details.

Henry F. Alten, Lancaster, O., will build as additions to his plant one building, 35 x 60 ft., and another 40 x 70 ft. He has been successfully conducting a foundry and machine shop.

The Security Steel & Iron Co. is making extensive improvements to its plant at Green Island, N. Y., formerly the Gilbert Car Works.

The Maritime Nail Co., Ltd., St. John, N. B., will rebuild its plant, recently destroyed by fire. The buildings when competed will have floor space of 35,000 sq. ft. The company will be in the market for a line of machine tools. Some of the departments will be in operation by July 1.

The Kenton Machine Works, Kenton, O., about to erect a building for the manufacture of gas and gasoline engines. The structure will be of brick and iron and will be equipped with traveling cranes. The company will install its own electric lighting plant, and considerable new machinery will be required.

The plant of the United States Tube Co., Buffalo, N. Y., recently sold to George Timmons, of Syracuse, N. Y., by the receiver, subject to confirmation of the court, will, if the sale is confirmed, be enlarged by the purchaser, and the working force brought up to 200 men. Mr. Timmons was formerly connected with the National Tube Co.'s works, of Syracuse.

The Buffalo Box Factory, Buffalo, N. Y., recently destroyed by fire, is to be rebuilt upon a new site with a fireproof structure, 100 x 300 ft., four stories in height with basement, and equipped with new machinery throughout. An electric power plant will also be installed.

The Pittsburg and Valley Districts:—

Stack No. 1 of the South Sharon plant of the Carnegie Steel Co. last week again broke all previous records by producing 636 tons in 24 hours. The best previous record for this furnace has 603 tons, which was made only a short time ago. Efforts are now being made to produce 19,000 tons from this stack during the month of March and if this is done all previous records for one month's production at any furnace will be broken. One of the Duquesne furnaces now holds the record for one month's production.

The Pittsburg Pipe & Iron Co. has removed to its new plant, McKees Rocks, Pittsburg. The company deals in all kinds of second-hand pipe.

The Damascus Bronze Co., Allegheny, has purchased a lot adjoining its plant on which an addition is to be shortly built. The demand for the company's product has so greatly increased in the past few years that it is necessary to secure more room.

The Wilkes Rolling Mill, Sharon, Pa., resumed operations this week after an extended idleness. All of the puddling furnaces are on in full.

Of the original allotment of $771,500 of bonds offered the public through Wheeling banks by the LaBelle Iron Works, of Steubenville, O., only $100,000 remains unsold, and on April 1 the price of these will be advanced from 92½ to 93½ and accrued interest.

Four additional sheet mills of the Ætna-Standard plant of the American Sheet & Tin Plate Co., Bridgeport, O., were placed in operation this week, and an additional four mills will probably be placed in operation next week.

The Robinson Iron & Steel Co. contemplates the erection of a plant at Scottdale, Pa., for the purpose of manufacturing a high grade bar iron according to a refining process patented by Richard Robinson, of Pittsburg. An experimental plant is in operation at Washington, Pa. Considerable stock was subscribed for by citizens of Scottdale.

The Martins Ferry, O., tin mill of the American Sheet & Tin Plate Co. resumed operations this week, after being closed for nearly a week on account of a strike of the screw boys, who refused to accept the reduction of 20 percent in the tin mills which went into effect last week.

The Walker plant of the American Bridge Co., Homestead, Pa., is being dismantled and the machinery is being shipped to the company's new works at Ambridge, Pa. It has been reported that the Mesta Machine Co. would purchase the property for additions to its already large plant, but these rumors are unconfirmed.

The entire open-hearth department of the South Sharon works of the Carnegie Steel Co., is now in operation for the first time in many months. The plant contains twelve 50-ton open-hearth furnaces.

In the suit of the West Penn Foundry & Machine Co., of Avonmore, Pa., against the St. Louis Plate Glass Co., an action to recover an amount alleged to be due for supplying machinery, the defendant has filed an answer at Pittsburg denying any amount being due, and setting up a claim f $24,027.94 as damages and expenses for delay caused by the plaintiff not meeting specifications fully.

The Pittsburg Clay Product Co. will apply for a Pennsylvania charter on April 14, for the manufacture of all kinds of clay products. The incorporators are: Thomas B. Freeman, L. D. Strouss, John W. Boileau, W. S. Ravenscroft and George M. Hosack. The company will be capitalized at $50,000 and will erect a plant near Pittsburg.

Two mills of the Standard Tin Plate Co., Canonsburg, Pa., commenced operations last week and three more commenced operations this week. This is an entirely new plant and was completed some time ago, but did not commence operations on account of unfavorable trade conditions.

General Industrial Notes:—

The Perkins Machine Co., South Boston, Mass., has purchased the property at Warren, Mass., formerly occupied by the Slater Engine Co. The plant consists of a large machine shop and foundry. The Perkins company will continue the manufacture of its power presses at South Boston until the moving has proceeded well on toward completion. The work of moving was begun last week and is expected to be completed by June. The Perkins company had planned to erect a new plant in the immediate vicinity of Boston, and plans had been prepared, but the failure of the Slater Engine Co. left the Warren property on the hands of the owners, and the Perkins company took advantage of the opportunity. The plant which has just been purchased has been idle for eight months. It will be enlarged by building an addition on the west end of the machine shop and by increasing the size of the foundry.

The J. I. Case Threshing Machine Co., Racine, Wis., has taken a large contract for its specialties for shipment to the Argentine Republic.

The Wake Forest Foundry Co., Wake Forest, N. C., has purchased the plant of the W. B. Dunn Plow Co.

The Jackson Knife & Shear Co., Fremont, O., which formerly manufactured knives at its Fremont plant, is now making them at Bradford, Pa. Preparations are being made to increase the output of shears at the Fremont plant.

The directors of the Hillsdale Wheel Co., Hillsdale, Mich., have elected the following officers: Marvin E. Hall, president; J. Will Marvin, vice president; and T. M. Fant, secretary, treasurer and general manager. Mr. Fant succeeds George F. Gardner, who was unable longer to give the necessary time to the business. Work at the plant will be commenced at once.

George Kinney has leased to the Hoeffinghoff & Laue Foundry Co., Cincinnati, 100 ft. on the south side of Pearl street, west of Pike street for 15 years. The company is given the privilege to purchase the plant at the end of that time for $22,000. The annual rental is $1,100.

The stockholders of the Safety Steel Derrick Co., Bowling Green, O., have elected the following officers: William Tuller, president; Samuel Blakely, vice president; R. A. Beatty, secretary and treasurer; and William Tuller, general manager.

The Eastern Iron Co., Meriden, Conn., recently incorporated, will take over the plant of the Meridan Malleable Iron Co. The plant has a large foundry, well equipped, which has been idle for several years.

The Keagy & Lear Machine Co., Coshocton, O., recently increased its capital in order to obtain more money to carry on its business. It does not expect to build at present.

The National Woven Wire Co., Chicago, will move to Niles, Mich., and occupy the second floor of the Camden City Fan Co.'s plant. The city of Niles will build a warehouse for the concern at an expense of $2,500. The company employs 50 men.

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J. K. Dimmick & Co., Drexel Building	Philadelphia, Pa.
J. K. Dimmick & Co., Murtland Building	Pittsburg, Pa.
J. K. Dimmick & Co., Ellicott Square	Buffalo, N. Y.
Robert Field, 1105 Traction Building	Cincinnati, O.
William Wieman, 605 Citizens Bank Building	Cleveland, O.
E. C. Smith, 506 Commonwealth Trust Building	St. Louis, Mo.
David Evans, 1030 Monadnock Block	Chicago, Ill.
W. H. Palmer, Pioneer Press Building	St. Paul, Minn.
Zimmerman-Wells-Brown Co., 2d and Ash Streets	Portland, Ore.
Hardy Greenwood, P. O. Box 751	San Antonio, Tex.
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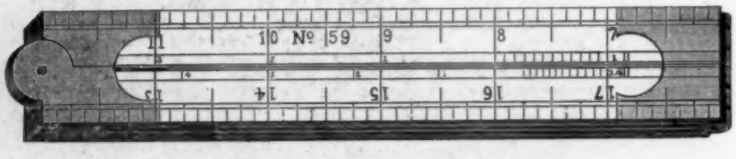

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